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12 MAY 1987

Worldwide Report

NUCLEAR DEVELOPMENT AND PROLIFERATION

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NUCLEAR DEVELOPMENT AND PROLIFERATION

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CONSTRUCTION OF MULTIPURPOSE RESEARCH REACTOR TO BEGIN NOV 87

Seoul CHUNGANG ILBO in Korean 15 March 87 P8

[Article by reporter Kim Kwang-sop]

[Text] Construction of 30-megawatt Multi-purpose Research Reactor (MRR) will begin in November of this year. Basic design work is done by the Korea Advanced Electric Research Institute (KAERI) and the Korea Electric Power Company (KEPCO) will finish the detailed design work by October. The government will invest approximately 50 billion won in this project.

The MRR, which is scheduled to be operational in the 1990's, is absolutely necessary in order for Korea to produce nuclear fuels. It will provide nuclear fuel efficiency tests and sorting impurities out of nuclear fuels (By 1988 Korean government is planning to build two nuclear fuel production plants, a 100 ton capacity heavy water reactor and a 200 ton capacity light water reactor plants.) and the waste materials generated from the operation of the MRR will provide an additional energy for air conditioning and heating through the neutron radiography.

Construction of this MRR using domestic technology and engineering will be a test for Korea in the development of nuclear power generating technologies as well as safety in operating nuclear power plants in the future.

When finished, the Atomic Energy of Canada, Limited (AECL) will conduct the technical verification and examination of the MRR, and compare it with Canadian reactors.

The government will complete placing orders of equipment and materials for MRR construction by next year. The government will also construct a separate research building within the KAERI premises for the MRR.

Following completion of this MRR, the government plans to do nuclear power plant design works hoping that domestic technology will be able to develop a new type of reactor by 1990 to 2000. "With a little more experience, Korea probably will be able to export research reactor technology in the early 2000's ..." an official of the Ministry of Science & Technology stated.

CSO: 4107/158

MONAZITE PLANT FOR NUCLEAR FUEL PLANNED

Bangkok SIAM RAT in Thai 3 Jan 87 pp 1, 16

[Unattributed report: "Build Plant To Convert Monazite for Use As Nuclear Fuel"]

[Text] The Ministry of Science, Technology, and Energy has made progress in building a monazite processing plant. When this is completed, the plant will produce a very valuable ore like tantalum. After being smelted, the monazite can be used as a nuclear fuel.

Mr Athon Pathumsut, the secretary general of the Office of Atomic Energy for Peace, Ministry of Science, Technology, and Energy, talked about the plant for converting monazite to uranium and thorium for use as nuclear fuel. He said that for fiscal year 1987, 1 million baht has been allotted for drawing up plans for a plant with a capacity of 300 tons per year. It is expected that this will take 36 weeks.

Mr Athon said that an advisory company will draw up the plans. But so far, no decision has been made on which company will be selected. After plans have been drawn up, construction is expected to get underway next year (1988) and be completed within 2 years.

Mr Athon said that this is a good time to implement this program, because this will increase the value of the ore just like tantalum. The raw ore can be sold for only about 8,000 baht per ton. But after processing, it can be sold for 20 times that after deducting expenses.

The secretary general of the Office of Atomic Energy for Peace said that this program is included in the 6th Development Plan of the Ministry of Science. A small plant was built as part of a pilot project, and good results were achieved. Thus, the details were submitted in order to build this plant.

Mr Athon said that the Department of Mineral Resources has confirmed that there are sufficient quantities of monazite to keep a plant with a capacity of 300 tons per year operating for 15 years. After the plant has been built, if it proves commercially viable, the Ministry of Science will take further action, and it may allow the private sector to participate.

Mr Athon said that Japan is engaged in a joint monazite separation project with Malaysia. This is different from our project. We will make full use of the ore. But Japan will extract only the rare raw material. Japan has contacted us about participating in this project both directly and indirectly.

11943

CSO: 5100/4308

CLARK VOICES CONCERN ABOUT U.S.-JAPAN PLUTONIUM OVERFLIGHTS

Toronto THE GLOBE AND MAIL in English 24 Mar 87 p A8

[Article by Patricia Poirier]

[Text]

OTTAWA

Canada has the legal right to prevent jets carrying toxic nuclear fuel from flying over its air space, External Affairs Minister Joe Clark said.

"We have already contacted the Americans to express our concerns about the implications of such a project and to tell them what our legal stand is," Mr. Clark told reporters yesterday in Ottawa.

A draft 30-year agreement signed in January by Japan and the United States provides for the first regular air shipments of large amounts of highly toxic plutonium from U.S.-made plants to Japan, although the deal has not been ratified by either country. The flights would pass over northern Canada.

Mr. Clark said Canada has the legal right to disallow the flights, although he did not say whether Ottawa would take such action.

In the Commons, opposition MPs expressed concern over the safety of shipping the plutonium by plane. Transport Minister John Crosbie

said he could see no reason to change the federal law on transportation of dangerous goods to prevent the flights.

"We already have an adequate legislative framework and we also have the international convention under which we can act. ... We have several options," he said.

Mr. Crosbie stressed that the agreement has not been ratified. If the project goes ahead, Canada could request that notification be given and approval received before any flight over its air space. He said Canada could deny permission for the flights under the rules of the International Civil Aviation Organization.

"We certainly would require notice, and require that all safety requirements be met if we did agree ...," Mr. Crosbie later told reporters.

"Nuclear fuels have to be moved; dangerous goods have to be moved. That's why we have legislation on transportation of dangerous goods. As long as all proper and reasonable regulations are met and safety measures are taken you just can't, per se, say no," he said.

/9274

CSO: 5120/6

DEPUTY MINISTER ON RADIATION AFTER CHERNOBYL

AU071203 Sofia RABOTNICHESKO DELO in Bulgarian 5 Apr 87 p 2

[BTA report on an interview with Prof Lyubomir Shindarov, first deputy minister of public health, by Bulgarian television on 4 April, entitled "There Is No Cause for Alarm"]

[Excerpts] In its "Panorama" program on 4 April, Bulgarian television broadcast an interview with Prof Lyubomir Shindarov, first deputy minister of public health and chief state sanitary inspector.

Asked whether there has been any change in the country's background radiation he answered: yes, there has been a change, the facts of which should be known, without underestimation or exaggeration. As you know, at the end of April last year our country was partially affected when in some places, there was a fall-out of radioactive substances released into the atmosphere after the accident at the Chernobyl nuclear plant. Of all the radioactive substances that affected our country there were there which have an effect on people's health or the environment: radioactive iodine, strontium, and cesium. The influence of radioactive iodine has already disappeared; it accounted for 90 percent or even more of the radioactive substances. The process of its disintegration began at the beginning of June and ended completely toward the end of the month. The open water reservoirs became pure again, and thus joined the pure water and air of the country. The country's background radiation became fully normal as before.

The second radioactive substance--strontium--is the most dangerous substance for the human organism because it can accumulate in the bones, does not disintegrate, and in fact affects man throughout his life with all the subsequent negative consequences for his health. Because of the characteristics of the radioactive fuel of the Chernobyl nuclear plant, strontium accounts for such negligible quantities that we do not attribute any importance to it. It is fully harmless for the health of the people in our country.

The case of cesium is somewhat different. As we expected, during the fall and winter months the amount of cesium in the meat and internal organs of domestic animals, which were fed with fodder harvested during the spring and summer, when there were still radioactive emissions, began to increase. Prof Shindarov cited precise data about the contents of cesium in foodstuffs of animal origin during the period of the greatest increase. They are average figures for the

entire country, and are computed on the basis of 1 kilogram foodstuffs. Poultry meat and eggs are totally free of radioactive substances. In pork, veal, and lamb the increase is from one-tenth to one-quarter below the norm, in other words, under the maximum permitted amount, which even when consumed with 1 kilogram of meat does not negatively influence the organism. In milk the increase is from one-eighth to one-fourth below the norm, milk products one-twelfth to one-quarter below the norm, and vegetables, as before, one-thirtieth below the norm. The cesium in fruit is one-fifth and in grain--one-third below the norm.

Since food is the main source of radioactive substance, inspection of food is very strict. Inspections are conducted by governmental organs and other competent institutions in our country. The norms of radioactive content in foodstuffs in our country are among the strictest in Europe, while our laws related to the protection of the population against radiation are among the strictest in the world. Anything that could possibly exceed the permitted limit does not reach the population--it is confiscated and destroyed. Bulgarian citizens, the protection of whose health has always been a matter of the closest concern on the part of the party and state, can rest absolutely assured. There are no objective conditions for or possibilities of a radiation hazard in our country, and second, a very strict, constant, and systematic control is conducted throughout the country.

/9274

CSO: 5100/3011

NUCLEAR POLICY, FOURTH PLANT OPTIONS WEIGHED

Decision on Plant Still Pending

Buenos Aires CLARIN in Spanish 22 Mar 87 pp 22-23

[Article by Eleonora Gosman]

[Text] Yesterday was the deadline the executive had set for the CNEA [National Atomic Energy Commission] to submit its proposal on the type, power, and site of the fourth nuclear plant. But the CNEA was not able to complete work on its proposal by the scheduled date.

Still, this delay will not drag on beyond March, despite the possibility of getting a new extension. The pressure put on the CNEA to hurry has given rise to some doubts: analysts are wondering if a few days are really enough to evaluate the two competing project proposals and to decide which will be the better one from the technical, economic, and financial viewpoints. Especially, they allege, as the option that is finally chosen will have an impact on the entire nuclear program: from now on, just one type of reactor will be built in Argentina, not two types, as we have had until the present time.

Several weeks ago ENACE [Argentine Nuclear Power Plants Enterprise] presented its proposal during a public ceremony held at the CNEA's headquarters. The Nuclear Power Plants Division [of the CNEA] did the same last Monday, but its entry on the stage went unheralded. The contenders use similar arguments to defend their bids: both are the product of their own design, based on technologies transferred by foreign companies.

The representatives of the two companies, Erhard Gaedtke from the German KWU [Kraftwerk Union] and Raul Palou of the Canadian AECL [Atomic Energy of Canada Ltd], are both keeping a low profile, and are not engaging too publicly in this contest. They both admit that either of the commercial versions—the pressure container reactor or the pressure tube reactor—has advantages and disadvantages. In the end, the technical handicap facing both types of plants is similar.

The differences would lie, then, in other aspects: for example, possible sources of financing; the safeguards problem; and possibly, the initial investment required.

Argentina's Own Capability

The Canadians and Germans both believe that Argentina has the capability to build their nuclear plant model using its own resources. The smaller size of the future plant—which will deliver 380 MW instead of the 600 MW provided by Embalse and the 690 MW to be generated by Atucha II—apparently presents no obstacle. According to the two foreign firms, the projects can be executed successfully without the input of external assistance.

Although KWU has not been able to transfer all of the design and engineering technology for Atucha II because of delays in the project, in the opinion of KWU's local representative, that fact should not much influence the development of Argos, the variant developed by ENACE.

The Association of Professionals of the CNEA, which numbers about 1,000 scientists and technical people among its members, judges that "there are reasons why the fourth Argentine plant should maintain continuity in design and module with the CANDU-type reactor located at Embalse." Among the reasons put forward, they emphasize economic factors. "Canada's bid for the current Atucha II plant was about \$500 million less than the German bid," they noted.

In both instances, the amount of Argentine participation in building the future nuclear plant will depend on economic, rather than technical factors. The companies feel that the quantity of components to be imported will depend on domestic price levels and on the "cost which Argentina is prepared to pay for self-sufficiency."

These data make it quite clear that the CNEA's decision will be a complex one. Will the few remaining days left be enough to make the final decision?

Uncertain Future

Buenos Aires CLARIN in Spanish 22 Mar 87 p 22

[Article by Eleonora Gosman]

[Text] The delays in the Atucha II project, which at this rate will not be completed before 1995, are clouding the future of the fourth nuclear plant which Argentina is planning to build.

According to Erhard Gaedtke, the head of KWU in Argentina, the delay—it is already running 5 years behind schedule—has an impact on several levels. First of all, it means a considerable increase in the initial cost of the plant, which has risen from \$1.6 to \$2.2 billion. In addition, he explained that the German firm, a subsidiary of Siemens, has not yet been able to complete the technology transfer scheduled in its contracts with the CNEA. "The pending documentation can only be transferred in practice, and not just through paperwork," he explains.

In Gaedtke's view, this fact does not limit Argentina's present capability to design a pressure container reactor based on KWU technology. "Proof of this is the Argos proposal ENACE has prepared for the fourth plant. This is not a copy of Atucha I or Atucha II, since it incorporates original features in terms of safety."

Construction of the project will apparently not require foreign assistance. In any event, KWU is a direct participant in ENACE--it owns 25 percent of its stock, while the 75 percent remaining belongs to the CNEA. That is something to be taken into consideration in this case.

Imports

The technology transfer is not limited to design: there are over 30 contracts between German suppliers or companies operating in other parts of the world and Argentine component manufacturers. KWU feels it is feasible for the plant to be built totally in Argentina, if the ENACE project is selected. The drawbacks are not technical, but rather economic and financial.

"In Atucha II, lists of components to be imported and lists of others to be made locally were prepared. In addition, we also had a list of another group whose source was to be decided on during the project construction. But the shortage of funds forced the CNEA to shift to Germany the production of some pieces of equipment that could have been made in Argentina." The KWU representative means that domestic price levels, which are much higher than international prices, influenced the CNEA in making that decision.

Safeguards

[Question] How do safeguards influence technology transfers and exports of plants to other countries?

[Answer] Agreements were signed for Atucha II in which Germany required safeguards only for this plant, and did not ask that all of Argentina's projects or plants be put under international monitoring. Argentina accepted this, and in the future, if it wants to export KWU nuclear power plants or technology to third countries, the only thing that would be required is that Argentina insist that the purchasing country put the exported product under safeguards. Argentina has not signed international agreements--like the Nuclear Non-Proliferation Treaty--which require complete monitoring of its facilities. Argentina does not accept that. Germany does not require it, and is not going to require it. It is a German policy to limit its responsibility as a supplier, understanding that the rest is up to each nation. Moreover, agreements have been signed with Argentina providing for joint exports to other Latin American nations.

Selection

[Question] Do you believe the CNEA can select the definitive proposal in just a few days?

[Answer] The CNEA has acquired experience with both types of plants, so it should be able to make a quick decision. But in any event, a technical analysis of the two project proposals will take several months, not just a few days. Both reactors have advantages and disadvantages. In terms of technical details, both of them work perfectly well. So the evaluation has to be based on technology transfers--where exports and restrictions imposed by safeguards come into play--and on economic and financial issues.

A Difficult Choice

Buenos Aires CLARIN in Spanish 22 Mar 87 p 22

[Article by Eleonora Gosman]

[Text] There is apparently nothing to prevent the CNEA from building a nuclear power plant like Embalse, using its own resources, without any foreign assistance.

So says Atomic Energy of Canada, Ltd, the Canadian firm that developed the CANDU technology for pressure tube reactors. Engineer Raul Palou, AECL's representative in Argentina, was quite clear about this: "The Argentine atomic organization has all the documentation, technology, and essentially all the human resources it would need to do this; nor would it require any prior commercial agreement with the company."

Nor should Argentina have any difficulties in building a smaller plant of the same type: for example, one that would deliver 380 MW power, instead of Embalse's 600 MW. "In any case, the AECL's aid would depend solely on Argentina's decision to adopt innovations introduced in Canada to improve the product."

Furthermore, there are no technical reasons that would require Argentina to import components from Canada. "Everything will depend on the level of self-sufficiency that Argentina wants to attain and on the price it is prepared to pay to develop its local industry. Those are political and economic-financial decisions," pointed out the AECL's nuclear power specialist.

Safeguards

[Question] What restrictions do safeguards impose on the domestic use of the technology transferred and on exports to third countries?

[Answer] Originally, Argentina planned to develop its nuclear plan based on CANDU technology power plants. Therefore, a design and engineering technology transfer agreement was built into the Embalse purchase contract. The agreement also covered a two-way exchange of personnel. At that time, there were plans to create a national nuclear technology enterprise which would be in charge of future power plants, in which AECL would be involved as a supplier of technical and personnel assistance, but would not have any direct participation. Consequently, there are no limitations on building plants of this type in Argentina, except in relation to supplying information provided by AECL to foreign companies. On the subject of exports--an issue which was treated only marginally at that time--the only requirement for transferring this documentation to third countries is a prior commercial agreement. As it happens, in today's world the sale of a plant always includes some form of transfer as well. Finally, the clauses on safeguards are the normal ones for this type of operation; the agreements are country-to-country agreements, and so are out of my company's control. I do want to say that a few days ago there were informal contacts between the commission and AECL, in which the issue of exports was discussed, and the Canadian firm said that from a commercial viewpoint, it was prepared to reach an agreement. Of course, the political aspects do require that representatives of the Argentine government make contact with Canadian government representatives.

Comparative Advantages

[Question] How would you evaluate the advantages of the two types of plants?

[Answer] On that topic, I will just mention the evaluation made by the ministry of international trade and industry of Japan. In an official report, it cited CANDU as an economically sound and tested reactor, and described it as the most efficient of all the reactors which use natural uranium as a fuel.

Moreover, in evaluating a reactor's advantages, a number of factors have to be considered: for example, the impact of research and development investments in the initial cost of the plant--to be amortized over one or more plants--and maintenance costs throughout its life. The possibility of sharing operational and maintenance experiences with multiple users enables these costs to be distributed among many units. In the CANDU case, there is a users' information network, of which the CNEA is a member. It offers immediate access to solutions of problems which have arisen in other plants, and to developments made by other plant operators.

7679

CSO: 5100/2083

CANDU, KWU OFFERS TO BUILD FOURTH NUCLEAR PLANT STUDIED

Buenos Aires CLARIN in Spanish 17 Mar 87 p 17

[Article by Daniel Arias]

[Text] 1987 promises to be a decisive year for Argentina's nuclear future. Argentina must decide which system it will use for the construction of its fourth plant. This selection will then determine other later decisions, for, in order to standardize designs, the fourth power plant will probably be the prototype for many nuclear plants to follow. But there is still even more involved in this decision: Argentina is a potential exporter of nuclear reactors, and between now and the end of the century a number of the poorer nations will be in the market to buy power plants. So what Argentina decides today will become its winning—or losing—card in future international bids, where it will be competing in a tough fight against the currently dominant technologies. So it is clear that, even though our fourth plant will be minute in comparison with the models currently in vogue (a power of barely 380 MW, instead of the 750 MW of Atucha II, our third plant), the decision how to build it will be a fateful one.

Our plants, like those of other poor nations, operate with an equally poor fuel: natural uranium. This means that we don't have to rely on foreign suppliers of enriched uranium: we own both the cart and the horse that pulls it. Given this basic option, whenever we have had to add plants to our national electricity system, in each situation Argentina had to choose between one of the world's two best natural uranium technologies: either CANDU, a TP [Pressurized Tubes] system, or RP [Pressurized Container]. The latter system, used in Atucha I and II, requires an enormous and highly resistant container filled with heavy water which is heated to over 300° while circulating through the plant's core. The container has to withstand extreme pressures; it is a sort of super pressure cooker heated from inside by an object at a high temperature. This concept, the pet project of the German firm KWU, is quite different from the CANDU design of the AECL [Atomic Energy Commission of Canada Ltd], which heats the heavy water in a great many highly resistant pipes (the pressurized tubes), each of which contains a hot object (this creates a sequence of fuel elements).

Competing Publicity

When comparing technologies, each set of promotional literature has its own particular sound. Generally speaking, the advocates of the CANDU system say that it is more modern and will have a longer future, and will provide triple savings: lower installation costs, better fuel usage, and cheaper fuel costs. They also say—in a simile comparing power plants to engines—that a CANDU facility has a better "mileage" and "acceleration" combination, something that is vital in a power network in a still developing nation, with a consumption demand whose hourly variation forces a plant to "slow down" and "speed up" like a car.

They have figures and charts to prove all of this.

The supporters of the German system, of course, do their best to tear the pro-Canadian argument to shreds. Their cost tables demonstrate convincingly that the German RP plants are less wasteful and more robust. The pro-German technology people do admit that theirs is a more conservative technology, but they argue that for this very reason it is more reliable and has a longer future.

Both sides swear that their equipment will last for at least 10 years longer than the 30 years expected of every plant, and laugh at such claims in the mouth of their competitor.

In addition, both AECL and KWU are aware that Argentina is a fairly troublesome purchaser in terms of transfers of knowhow, and that it fully intends to appropriate for its own use not only the equipment, but also methods of operating and maintaining it; Argentina also plans to make spare parts in Argentina, to improve the design, and finally, to actually build such plants in Argentina without any outside help—or even worse, to export these systems to other countries. This is the sort of customer to whom it is better to sell the fruit without the seed, because the customer has every intention of planting fruit trees for his own use. So, in this situation, as we might expect, our two foreign suppliers are each claiming for themselves a sole and exclusive monopoly on an unprecedented intellectual generosity when it becomes time to transfer sensitive technical secrets to us.

But on the contrary, backers of each of the two systems agree on painting their competitor's system as an assemblage of technology that it would be impossible to ever reproduce in Argentina: either for inherently engineering-related reasons ("those very refined components that our competitor uses are beyond the reach of Argentine industry") or political reasons ("our opponents never share really important knowhow").

Unfortunately, the views expressed in private industry today are more evasions than opinions. The executives would rather not show which side they

are on, in order to avoid reprisals (let's call this scrounging for contracts) from the opposition lobby, if the other side should win. Professional, technical and union associations active in the nuclear field are definitely in favor of the CANDU technology ("cheaper, more productive, easier to make an Argentine technology, equally safe," they say), but it is hard for their views to carry much weight at the moment of decision. It is to be expected that technical factors will not be the only things considered; on two occasions in the past (for the two Atucha plants), it was thought that AECL had won the contract, but KWU pulled off last-minute victories through pure commercial and political craftiness. During the 1960s, when the CNEA [National Atomic Energy Commission] seemed determined to start with a CANDU plant, the Germans came back with a financial deal that Argentina just couldn't refuse, a government-to-government package agreement, and they got Atucha I. For Atucha II, despite the previous Canadian win of the Embalse contract, and even more, despite the CNEA's commitment to purchase from then on solely CANDU-type equipment (no matter what its actual national origin), the Germans beat out the AECL by taking advantage of the fact that the AECL is bound to Canadian foreign policy. The government of Canada, very closely allied with the United States, demanded safeguards that were unacceptable for our nuclear sovereignty (controls and more controls of our fuel cycles, and outright bans if the CNEA wanted to offer its own products freely on the world market). KWU then won Atucha II through its competitor's "commercial suicide," selling us equipment that was 50 percent more expensive than the CANDU system, without making the slightest effort. As we see, there are more than nuts and bolts involved in this type of decision.

But on every occasion, there have always been at least two race horses drawn up at the starting gate, and some real competition. That is the minimum that a country needs in order to choose, yet it seems to be precisely what we are lacking on this occasion, which may determine the course of our atomic future. The judge is ready: it is the CNEA's Fourth Power Plant Committee, a collegial-style organization whose ruling is expected sometime this month [March]. But this judge has only one complete proposal in hand.

Attacks of Punctuality

The committee was supposed to review two complete proposals: one CANDU and one RP design. The RP proposal was given to ENACE [Argentine Nuclear Power Plants Enterprise], a state firm in which KWU holds 25 percent of the stock, reputed to be the best Latin American group handling power plant architecture. After patient studies, ENACE presented its plans for a 380-MW plant with a pressurized container, a plan that drew praise from more than one international source. It is apparently an impeccable design, and even better, it is sufficiently Argentine so that it could be repeated without any foreign intellectual assistance. The DCN [Nuclear Power Plant Division] of the CNEA was supposed to have ready for comparison a CANDU-type system with identical power, but internal management problems have apparently caused a delay in presenting

this proposal to the Fourth Plant Committee. This delay, which has dragged on without being resolved by the CNEA management, left the committee with just one horse at the starting gate. In this situation, engineer Alberto Costantini, chairman of the CNEA, publicly stated that the decision on the future plant would still be made in March. This sudden attack of punctuality does not fit too well with Argentina's official nuclear policy, which has systematically refused to set deadlines for granting funds or starting construction, much less for completing and starting in operation a plant that is still only words and paper right now. Moreover, the Argentine electrical system has no need of an ultrarapid injection of nuclear power. All of this means that doubts are lingering about why it is impossible to wait for 3 more months before deciding. That is apparently the length of time it would take to have two complete proposals ready for review. One horse may well be wonderful, but if it is the only one running, the public might be inclined to think it belongs to the person in charge of the race.

7679

CSO: 5100/2076

ARGENTINA

GOVERNMENT TO COOPERATE ON IRANIAN NUCLEAR PLANT

PY131311 Buenos Aires NOTICIAS ARGENTINAS in Spanish 1635 GMT 9 Mar 87

[Text] Buenos Aires, 9 Mar (OAG)—The National Commission for Atomic Energy (CNEA) is planning to participate in the final stages of the construction of a nuclear power plant in Iran, which is considered among the most powerful in the Third World with a capacity of 1,233 megawatts.

This information was published in the weekly *NUESTRA HOY*, which specializes in foreign trade and exchange news. The magazine cited diplomatic, industrial, and military sources, and attributed the initiative to "a new pragmatic approach in Argentine foreign trade policy."

The Iranian nuclear plant, which was begun toward the end of the government of Shah Reza Pahlevi, used enriched uranium. Thus, Argentina could only provide its experience in the engineering details because Argentine experts work exclusively with natural uranium.

The weekly stated that its sources did not reveal how much Argentina would earn in this venture, nor who would pay the expenses. Iran itself could pay them, as could the West German firm KWU (Kraftwerke Union), which is a partner with Argentina in the Argentine Nuclear Enterprise for Electrical Power Plants (ENLACE). KWU is in charge of this project, along with Iranian and Spanish companies.

The sources said, however, that in 1985 the trade balance between Argentina and Iran was \$550 million, of which \$349 was paid for Argentine grain, and \$1 million for bull semen.

It is important to emphasize the announcement made last week by a high-ranking military industry official regarding the sale of \$31 million worth of Argentine-made armaments to Iran.

The foreign enterprises participating in the construction of the Iranian reactor are the Atomic Energy Organization of Iran (AEOI), the KWU, the Spanish firm Associated Enterprises (Empresarios Agrupados) and the Argentine CNEA.

The KWU, which holds 75 percent of the shares, is associated with the CNEA in ENLACE, and built the Atucha I nuclear plant. It is presently in charge of the Atucha II project.

The Spanish firm, which might work on the Iranian project called Bushehr I on Khark Island, is also building the KWU-designed Trilla reactor in Spain.

The construction of Bushehr I began in 1979 under the Shah's government, but it was interrupted after the Islamic revolution put the Ayatallah Khomeyni in power.

In 1980, however, Iran suffered greatly from electric power shortages and decided to continue the construction of the reactor, which is 75 percent complete.

The remaining 25 percent includes the most important part of the reactor, the generator plant fueled by enriched uranium.

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CSO: 5100/2081

EXPERT PRAISES FOOD IRRADIATION PLANT

PA162110 Havana International Service in Spanish 2300 GMT 14 Mar 87

[Interview with Dr Isaac Marcos Cohen, Manager of Applications of the Argentine National Commission for Atomic Energy (CNEA) by unidentified Radio Havana reporter in Havana; no date given--recorded]

[Text] [Reporter] We are talking with Dr Isaac Marcos Cohen, CNEA applications manager, who has traveled to Havana for the opening of the first Cuban Food Irradiation Preservation Plant. Doctor, we would like to have your opinion of this first Cuban plant.

[Cohen] I am very favorably impressed on seeing the results of the efforts in the area of nuclear energy that are now bearing fruit with the opening of this plant. In my opinion, the concept behind the plant's design, the security systems--which are so important in our nuclear activity--and, above all, the projections for the future, are significant in such an important matter as the preservation of foodstuffs. I find it quite impressive from all points of view.

[Reporter] Have you had experience in this regard in Argentina?

[Dr Cohen] Yes. We have worked with an industrial irradiation plant since 1970. Before that, we had carried out laboratory experiments with irradiators. We have a very broad experience with the preservation of vegetables, red meats, fish, and poultry. At present, we are working under an agreement with the IAEA. The plant is working routinely on the sterilization of disposable biomedical products such as hypodermics or catheters and we have work groups studying the effects of radiation on polymers. This might have very significant applications in the future.

[Reporter] Are Argentina and Cuba planning to cooperate in this field?

[Cohen] As a matter of fact, yes. An agreement has already been signed that only needs to be implemented as regards preparing a plan of action. Both Argentine and Cuban officials are most willing and I believe the cooperation between them will be broad in scope. There is no doubt in my mind about it.

[Reporter] What is your opinion of the use of nuclear energy for peaceful purposes?

[Cohen] There is no doubt that at this time the world cannot rule out nuclear technology as the technology of the present and the future. Obviously, the peaceful use of nuclear energy is one of the keys to any country's progress. From that point of view, and as a result of my conversations with people who are involved in this field in Cuba, I have been very pleased to see that Cuba is, in my opinion, on the right track as regards the organization of its nuclear activities. That is another factor that has impressed me very favorably.

[Reporter] Thank you very much, doctor, for your statements for Radio Havana, Cuba.

/12232

CSO: 5100/2080

BRIEFS

CONSTANTINI RESIGNS 9 APRIL—Buenos Aires, 9 Apr (NA)—A few minutes ago Alberto Constantini, president of the National Atomic Energy Commission (CNEA), confirmed he had tendered his resignation as head of the CNEA because the Economy Ministry has failed to give him the necessary funds to continue the projects which include the construction of the Atucha II therm-nuclear plant. In a statement to Radio Continental, Constantini said Finance Secretary Mario Brodersohn, in response to his demands, has told him the payment to the suppliers would take place in 150 days. [Text] [Buenos Aires NOTICIAS ARGENTINAS in Spanish 1150 GMT 9 Apr 87 PY] /9738

CSO: 5100/2081

NAZARE VOWS NUCLEAR CYCLE CONTROL BY 1992

PY142204 Sao Paulo O ESTADO DE SAO PAULO in Portuguese 9 Apr 87 p 2

[By Assis Moreira]

[Text] Geneva -- Physicist Rex Nazare, president of the national Commission for Nuclear Energy (CENEA) said during a UN conference on the peaceful use of nuclear energy yesterday in Geneva that Brazil will master the full cycle of nuclear technology before 1992, "despite the lack of cooperation from the industrialized nations."

The mastery of the fuel cycle -- that is to say, of all the technical processes of uranium, from mining to enrichment -- could theoretically give the country the capability of producing "nuclear devices," or, to be precise, the atomic bomb. Nevertheless, Nazare said that "this will not necessarily happen in Brazil, because the degree of uranium enrichment we propose would not be sufficient for that purpose."

Nazare emphasized that "the Brazilian nuclear program is peaceful. Brazil will not produce nuclear devices because it supports the policy of disarmament. We did not sign the Nonproliferation Treaty, as the developed nations demanded, because it is discriminatory and unfair. We demonstrated our peaceful intentions by signing the Treaty of Tlatelolco which advocated the denuclearization of Latin America. In addition, President Sarney proposed at the United Nations denuclearization of the South Atlantic."

Nazare said that to gain control of the nuclear technology Brazil will need to design and build, within the next 5 years, a 5-megavolt research nuclear reactor relying exclusively on domestic technology. It should also have the capacity to produce all the radioisotopes the country needs. These radioisotopes, he assured, will be used for peaceful purposes in medicine, health, agriculture, industry, etc.

The UN Conference for the International Cooperation and Promotion of the Peaceful Use of Nuclear Energy, which opened in Geneva on 23 March and is scheduled to close tomorrow, has demonstrated to the Brazilian delegate that "as long as we depend on international cooperation, the powerful will stay powerful, and the weak will stay weak." That is why Brazil cannot do without an autonomous nuclear program to master the entire nuclear cycle.

He added that "the Brazilian nuclear program has two branches: one depends on bilateral agreements (with the United States, the FRG, etc), and the parallel program which is autonomous. The bilateral agreements grant only partial access to some technologies thereby keeping the country dependent on those technologies. Therefore, we choose to continue the autonomous program with the decisive participation of private enterprise."

Nazare stressed that Brazil could very well use nuclear energy, for example, "to boost agricultural production. As it happens," he said, "the developed countries that control nuclear technology have clearly shown at this conference they are not interested in giving developing countries access to such technology, even if it will help our social and economic development."

Nazare stressed that today it is impossible for developing nations to buy enriched uranium, if only for research reactors like the one CNEN has in Brazil, because the industrialized nations claim it is necessary to prevent nuclear proliferation. Rex Nazare countered by saying that "the developing nations do not produce nuclear bombs, but the countries that control the technology do."

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CSO: 5100/2087

NUCLEAR FUEL PACT SIGNED WITH ARGENTINA

PY240215 Paris AFP in Spanish 2333 GMT 23 Apr 87

[Text] Rio de Janeiro, 23 Apr (AFP) — Rex Nazare, president of the Brazilian National Commission for Nuclear Energy, said today in Rio de Janeiro that within 2 years, Brazil and Argentina will jointly produce fuel elements with a low percentage of enriched uranium for research reactors.

Nazare told reporters that when the two countries reach that goal, they will liberate themselves from foreign dependency and will take a very important step for the domination of nuclear technology for peaceful use. Rex Nazare reported that the agreement to carry out that project was signed at the fourth meeting of the Argentine-Brazilian Nuclear Cooperation, which concluded meetings in Rio de Janeiro today.

The Argentine delegation, lead by Jorge Sabato, secretary of state of international relations, included Adolfo Saracho, director of nuclear affairs and disarmament, and Captain Roberto Ornstein of the Argentine National Commission for Atomic Energy.

Sebastiao do Rego Barros Neto headed the Brazilian delegation, which included Rex Nazare.

The agreement to jointly produce fuel elements with a low percentage of enriched uranium for research reactors states that the first meeting for this purpose of specialists of the two countries will be held next May. The inventory of instruments and radiation equipment in the two countries to verify if dependency on third countries can be totally eliminated will conclude next May.

Nazare reported that in the area of protection, Brazil and Argentina are developing the process needed to establish total control over the material used in the two countries. He added that the technology to enrich uranium for the fuel elements of the research reactors will replace the highly enriched uranium fuel elements used in the past. He also noted that this shows the clear intention of the two countries to use those fuel elements only for peaceful purposes. He added that the agreement for the production of stable isotopes was signed on 20 November 1985 in Foz do Iguazu on the occasion of the meeting between Jose Sarney and Raul Alfonsin.

In a brief communique released tonight, the delegations reported that the fourth meeting of the working group of the Argentine-Brazilian Nuclear Cooperation conducted legal and technical studies on matters of nuclear cooperation. The communique indicated that the working group also studied the results of the contacts between

business groups of the two countries, the coordination of their respective nuclear policies in international meetings, and the works developed by the technical groups established in Protocol 17. The protocol, which was signed on 30 November 1985 in Foz do Iguazu, notes, among other things, the decision to cooperate for the joint development of high-density fuel elements for research reactors. The nuclear programs developed by Brazil and Argentina differ in the fuels used. Brazil uses enriched uranium, while Argentina uses natural uranium.

In November 1983 Argentina announced that it achieved the technological know-how to produce enriched uranium but Brazil has not yet reached that goal. Rex Nazare recently said that Brazil will obtain the complete cycle of nuclear fuel somewhere between 1990 and 1992.

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CSO: 5100/2089

NUCLEAR BOMB CAPABILITY UNCOVERED IN SECRET PROGRAM

PY220333 Madrid EFE in Spanish 0158 GMT 22 Apr 87

[Text] Brasilia, 21 Apr (EFE) -- A secret nuclear program, created by the military in 1964, and which has been implemented by the National Security Council [CSN] without governmental supervision, is about to produce a nuclear bomb. General Haroldo Erichsen da Fonseca, the Army secretary for science and technology, has said: "Although we do not seek to make nuclear bombs, with the know-how we are acquiring, we have the capability to make them." The program began in 1964 with secret funds that were not channeled through the Finance Ministry and which cost Brazil between \$1 billion and \$3 billion annually.

A VEJA article says that the decision was made after an official agreement for nuclear cooperation was signed with the FRG. VEJA regards the National Nuclear Energy Commission (CNEN) as "a civilian front for the parallel program." CNEN President Rex Nazare conceded that Brazil has made progress in this field. The article notes that the construction by the Brazilian Navy of a reactor for a nuclear submarine is another step toward the objective of making a nuclear bomb. VEJA adds that Brazil is setting up infrastructure facilities for this type of weapon, that the Navy and the Army are developing missiles to carry nuclear bombs, and that the testing grounds are ready.

Nazare told VEJA that the Sierra do Cachimbo ground -- in the southern part of Para State -- is not the only one, but that "there are others in the Amazon region." The existence of this parallel nuclear program was disclosed early this year by a Brazilian newspaper, which reported the existence of secret accounts in official banks through which government funds were being channeled. An investigation by the Federal Police, who were unaware of the existence of this secret program, turned up a bank account in the name of the CNEN president in a Rio de Janeiro bank.

Other accounts were in the name of advisers of the CNEN president: Colonel Carlos Lemos de Campos, Captain Marcos Alberto Barbosa, and Admiral Othon Luiz Pinheiro da Sila. These funds were invested in the Brazilian financial market, and the interest obtained from them were earmarked by the nuclear program. VEJA said the investigation concluded that the NSC and General Ruben Bayma Denis, chief of the presidential military household, were behind this program.

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CSO: 5100/2088

PAPER DISCUSSES PLANS FOR NUCLEAR SUBMARINE

PY151833 Sao Paulo O ESTADO DE SAO PAULO in Portuguese 12 Apr 87 p 9

[By Roberto Godoy]

[Text] The first practical result of the acquisition of the full uranium fuel cycle by Brazil will be an atomic attack submarine, which the Navy is developing and which should become operational by the year 2000. Rex Nazareth, president of the National Nuclear Energy Commission, (CNEN), announced last week that the acquisition of the uranium fuel cycle will be accomplished during the period 1990-92.

President Jose Sarney knows about the nuclear submarine project and gave the green light for the execution of those stages of the project that will have to be completed during his term of office; namely, the construction of the components factory in Ipero, in the Sorocaba (Sao Paulo State), and the partial reform of the arsenal in Ilha das Cobras, Rio de Janeiro State.

The Navy does not think that the development of this program "in any way" conflicts with Itamaraty's proposal to declare the South Atlantic a demilitarized zone. According to a statement to O ESTADO by an admiral working for the Material General Directorate, "a nuclear-powered ship is not the same thing as a naval nuclear weapon launching platform; regarding weapons, our submarine will be conventional." He added that the technical specifications, which "have just been drafted," indicate that it will be a light ship, displacing about 4,000 tons, having a speed of about 30 to 40 knots, and producing low noise.

So far, resources for this project have come from the Navy Ministry budget, which allocates 15.4 billion cruzados to the project for the 1987 fiscal year. This might be the reason why the admiral believes the Uranium Project is moving in "somewhat slow motion." The Uranium Project is intended to overcome the main technological barrier: being able to enrich uranium that in its natural state is "poor" in the U-235 isotope (which enriched to 3 percent is usable for the generation of electrical energy; to 70 percent, for driving power; to 93 percent, for military devices; and to 100 percent, for scientific research. The Navy's objective is to devise a method of enriching uranium to a minimum of 70 percent).

This investigation, which is part of a program that parallels the program under the Brazil-FRG nuclear agreement, is directed at enriching uranium by the method of uranium hexafluoride centrifugation, a method proved successful by UNESCO, a European consortium that includes the Netherlands, the FRG, and Great Britain. This method entails many difficulties; one of them is that posed by movable components of the centrifuge units, which turn at the fantastic speed of 40,000 revolutions per minute, or 2.4 million per hour.

The latest technical achievements in this field are centrifuges whose axle-shafts rest on magnetic bearings. Because they are practically floating, when they rotate, friction is nearly eliminated. The Navy intends to set up a line of up to 3,000 minicentrifuges, probably at Ipero. However, the official decision at this time is to assemble in Ipero the submarine's compact reactor components. This is another challenge the technicians must overcome.

The engineering of compact equipment is known, but extremely complex. "Once the fuel barrier is overcome, it will be easier to build a light-water (common-water) reactor," the admiral believes. He bases his assumption on the work being done for the Navy at the Nuclear and Energy Research Institute (IPEN) at the university, inside a building complex known as "the swan's nest." Important accomplishments have been made there, ranging from the study of the morphology of uranium bars, the prototype of the reactor (or part of it), to the production of uranium hexafluoride.

From an operational standpoint, the Brazilian nuclear submarine will be an ocean-going "killer," based on a relatively new class of ships — the Alfas — introduced by the Soviet Union in the 1970's, and improved by the French Rubis in 1984. Both are submersible ships, displacing 2,000-3,000 tons, very fast (the Alfas have a top speed of 74 KPH, and the Rubis 55 KPH), and both have high conventional fire power. The Brazilian model will have eight tubes for firing 533-mm electronically guided, heavy torpedoes. From underwater, this model will be able to launch antiship missiles of the Exocet (French) or Barracuda (Brazilian) type, with 250-kg warheads. The crew will be comprised of no more than 60. Its advantages will be the small size, ample space for electronic systems of combat and vigilance, and the capacity to operate away from logistical bases for an indefinite period, "depending exclusively on fisiological and psychological factors."

The Navy is currently learning to build conventional submarines. Two IKL-1400 model submarines have been contracted for in the FRG. They will be built in a Kiel shipyard, on the Baltic Sea. The technology will be transferred through a project bureau set up there. The Ingenieurkontor Lubeck will later supervise the construction of the second IKL-1400 submarine at the Ilha das Cobras arsenal. Simultaneously, if possible, or at a later stage, the NAC 1 should be built — the first fully national model to be built without foreign dependency.

The nuclear submarine project should come next. "This is the general idea of the timetable, but all this is connected in such a way that it won't be surprising if things suddenly start to move faster," the admiral said.

"Both the IKL and the NAC will incorporate all the technical advantages of the nuclear configurations — but they won't be nuclear-powered," explained the admiral, who then mentioned their ability to stay under water "for more than 50 days" and their highly sophisticated artificial intelligence systems.

Although the Navy's involvement has shown success, the parallel nuclear program is also making progress at Air Force and the Army research centers. The objectives are secret, but their application are subject to the government's political decision and will be made once the country has achieved total capability in this sector. At the Sao Jose dos Campos Airspace Technical Center (CTA), outside the boundaries of the "campus," functions the most secret unit of the CTA: The Advanced Studies Institute (IEAV), which sits by the Tamoi Highway leading to the Northern coastal region, secluded from prying eyes.

Only special visitors and staffers have access to the IEAV after a rigorous security check. Inside the main building, located underground, protected by a thick concrete slab, steel doors with electronically programmed locks, and armed guards, can be found the Cyber 170/750, the largest computer in Latin America with the capability of handling 10 million instruction per second. Refrigerated by freon gas, the Cyber seems to be "boiling." All the data available on nuclear subjects are stored here. The IEAV is involved in a project to enrich uranium by a method of isotopic separation based on laser ray stimulation -- a principle considered purely theoretical, but which has had a measure of practical success, and remains zealously locked inside the CTA.

One group might be willing to invest in the ultracentrifugation method which has already been explored by the Navy. Another group, known as "the battery people," is preparing a faster solution: Building a classical atomic battery or radioisotopic generator, which is poor power source, but an excellent source of plutonium, the raw material for the bomb. Physicist Rogerio Cerqueira Leite points out that "the fundamental difference between the two methods is that the one is refined but its purpose is vague, and the other is gross but its purpose is clear. We pick the battery if we want to manufacture a nuclear weapon."

The Air Force is also investigating a fast breeder reactor operating with thorium, a radioactive element found in monazite sand, for example, which is more abundant in Brazil than anywhere else in the world.

For the Army, the military applications of the atom are more restricted. The Army Technological Center (CETEX), located in Rio de Janeiro, participates in the general development program, but there is little information available. A specialist who has been working for CETEX until recently explained that "there is considerable intercommunication among the three services in this field. So the Army knows very well what to do whenever the technology is completely harnessed, and if it needs to resort to that technology in the future."

There was a time when heavy artillery shells with atomic warheads were considered. That idea was set aside, and the Army is now thinking of tactical ballistic missiles, with an initial range of about 150 km, capable of carrying conventional -- or nuclear -- warheads weighing more than 1 ton. A similar study to increase the strategic range of those missiles to 1,500 km is also part of the FAB [Brazilian Air Force] long-term plans.

At least two firms are now developing the first generation of those missiles. One of them is AVIBRAS Airspace, which has designed its formidable SS-300, with a range of 300 kilometers; the other is Orbita, a subsidiary of ENGESA [Specialized Engineers, Inc] which by year's end will unveil a prototype of its MB/EE-150 missile, with a range of 150 km.

If the parallel program is clearly directed at the national defense and security then won't it turn into a clandestine operation? The two officers questioned by O ESTADO are fully convinced that it will not. In their view, the decision as to the application in the next decade of knowhow which is being acquired now, will be political -- made by the government and Congress. They also contend that "the country has the sovereign right to acquire advanced technology and to employ it in the way it deems best." The two professionals agree on another point: In 95 or even 98 percent of the cases, the research methods and the application of the technology are exactly the same both for civilian and military purposes. "It is impossible to make rules in that regard," notes one of them, arguing that "If it were not so, international control and the existing safeguards to guarantee the peaceful uses of atomic energy would be unnecessary."

ARTICLE QUESTIONS NUCLEAR SUBMARINE POSSIBILITY

PY211613 Sao Paulo FOLHA DE SAO PAULO in Portuguese 18 Apr 87 p A5

[By Roberto Lopez]

[Text] It will be difficult for the Brazilian Navy to build its first nuclear submarine before the year 2000. Officials working on the project to provide the Navy with a Brazilian-made submarine, doubt that it can be successfully built this century.

Officials list three basic problems: a) the state of nuclear research in Brazil, which is not considered sufficiently advanced to allow a prediction as to when the Navy will be able to produce a nuclear reactor suitable for a submarine; b) the difficulties being confronted by the Rio de Janeiro Navy Arsenal in building a simple, conventional submarine using an FRG design are well known; and c) the uncertainty over the availability of resources for a project of this size.

A report on the matter, published by O ESTADO DE SAO PAULO on 12 April, was judged by FOLHA's sources to be excessively optimistic. The report said that the Navy would have an operational atomic submarine by the year 2000. This submarine would have a displacement of 4,000 tons, a speed of 30 to 40 knots, and eight 21-inch (533-mm) torpedo tubes, and it would have the capability of launching antiship missiles while submerged. FOLHA learned that it is unlikely that the Brazilian Navy would consider building a 4,000 ton nuclear submarine -- a vessel larger than the nuclear attack submarines presently being built in the United States, which have an approximate displacement of 3,000 tons.

The same sources stated that the maximum speed of the Brazilian submarine (under water) would be around 20 to 25 knots, for the simple reason that the Brazilian project will use enriched uranium in the "compact" reactor to be installed in the submarine. This provides a 70 percent enrichment and has a direct influence on the vessel's speed. U.S. nuclear submarines using 95 percent enriched uranium reach speeds of 25 to 30 knots an hour -- speeds of 30 and 40 knots seem to belong to the distant future.

The Brazilian nuclear submarine is not likely to have 8 torpedo tubes. The original idea of the work group in charge of the project was to submit a design with only 6 tubes. As for the caliber of the torpedos to be used, there is a basic doubt between the 21-inch, or the 23-inch torpedo which is the size of the torpedos presently manufactured in the FRG. The Brazilian Navy has been under strong FRG influence regarding submarines and this could result in the selection of the 23-inch torpedo.

The possibility that a Brazilian nuclear submarine will be able to launch a missile while submerged did not merit any in-depth consideration. This type of missile is very new and has never been tested in combat. The French firm Aerospatiale is manufacturing a version of the Exocet which can be launched by a submerged submarine. The Americans are producing the Harpoon, but the efficiency of these weapons is still in doubt. A major doubt lies in the fact that the device's capability to sink a surface target (such as a frigate), is unpredictable after it reaches the surface.

In fact, a preliminary draft of the basic requirements of the Brazilian nuclear submarine does not yet exist. The Navy Materiel General Directorate (Diretoria Geral de Material da Marinha) and the Navy General Staff are conducting studies on the various requirements that are today included in the most advanced nuclear submarine programs. It is not possible to anticipate by 13 years the weapons system a ship will carry. Officers who are experts in the matter have said that only after the Navy decides on the atomic reactor could other details of the design be examined; that is, the ship's size, speed, electronic equipment, and armament.

Therefore, there are two stages which the Navy Arsenal in Rio de Janeiro must finish: The construction of three IKL-209/1400 conventional submarines, using FRG technology; and the construction of the NAC-1, the first conventional submarine built entirely using national technology. The first NAC-1 is not scheduled to be finished until the second half of the 1990's — by this time the Navy Arsenal will probably have built the IKL-209 vessels as well. The trouble is that the Navy Arsenal is already 2 years behind in starting construction of the first IKL, and at this pace, any prediction is at best, risky.

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CSO: 5100/2088

BRAZIL

ANGRA I NUCLEAR PLANT OPERATING AT 50 PERCENT

PY132306 Sao Paulo O ESTADO DE SAO PAULO in Portuguese 9 Apr 87 p 29

[From the Rio de Janeiro Office]

[Text] Furnas [Furnas Electric Power Plants, Inc] Director Marcio Costa has reported that the Angra I nuclear plant was restarted 1 week ago and that on 8 April it had reached 50 percent of the potential output of its reactors. This comes following a series of operational improvements in the operational security, which had been demanded by the National Nuclear Energy Commission.

The Angra I plant is now supplying electricity to the southeastern grid, but its final commissioning test has not yet been approved. The reactor must gradually achieve its full potential during the final test.

According to Costa, the Angra I plant has implemented an emergency plan in case of accidents and has adopted the necessary measures if there is a need to evacuate the region. These measures were demanded in a lawsuit which was brought by several civilian organizations, including the Prosecutor General's Office of Rio de Janeiro State, against Angra I.

Costa also reported that pamphlets drafted by the Civil Defense Commission of Angra were distributed among the population. Lectures on safety were also given to the population, and sirens have been placed at strategic places in the area.

/9738

CSO: 5100/2084

SOVIETS OFFER KNOWHOW ON ATOMIC ENERGY USE

Madras THE HINDU in English 18 Mar 87 p 9

[Text]

NEW DELHI, March 17.

The Soviet Union has offered its expertise and knowhow for scientific co-operation in two important nuclear science-based technologies for the Department of Atomic Energy. "Radiation Technology" and a "dedicated synchrotron radiation (SR) source" are the two particle accelerator devices which have distinct industrial applications and immense applied research possibilities.

The technologies are the developments arising out of the accelerator research being done at the Institute of Nuclear Research of the Siberian Division of the USSR Academy of Sciences at Novosibirsk. This was stated by Mr. Alexander Skirsky, head of the institute at Novosibirsk who is a member of the Soviet scientific delegation now visiting India. Mr. Skirsky, a high-energy physicist and specialist in accelerator physics, spoke to THE HINDU about the nature of activities at Novosibirsk, the latest developments in the area of 'electron-positron' and 'proton-antiproton' colliding beam accelerators, nuclear fusion research in the USSR and possible areas of joint research activity between the two countries.

Accelerator for BARC: Talking of technologies that have emerged out of basic research in accelerator experiments, he singled out the high-powered electron accelerators and synchrotron sources as having made major inroads into industry, not only in the USSR but also in other countries. The high-powered electron accelerators are off-shoots of designs initially done for the so-called injectors which inject electrons (and positrons) at suitable energies into 'storage rings' where electrons (and positrons) are bunched, compressed and stored in a circulating mode before they are brought into head-on collision in the 'collider'. One such accelerator to be used for radiation technology has already been shipped to the Bhabha Atomic Research Centre (BARC) and will be installed there in the next three to four months.

At Novosibirsk, accelerators of energy range

one Million electron Volt (MeV) to 2 MeV are being produced and sold within the USSR and outside as well. These carry power in the range of 20 kW to 100 kW. The one sent to the BARC is of 1.7 MeV energy and 20 kW power. Our assistance in this will be to enable them to learn how to use high-power accelerator technology. The technology itself is, in some sense, known already. Mr. Skirsky said. Such accelerators are apparently in use in the Soviet industries for the last 10 years.

Grain disinfection: One important application of this accelerator based 'radiation technology' is grain disinfection. A device like the one supplied to the BARC will be able to disinfect grains at the rate of 200 tonnes/hr. After irradiation with electrons from the accelerator no further chemical disinfection is ever required because the radiation dose is sufficient to kill not only the live insects but also the eggs inside the grain. It is learnt that the BARC machine is intended for long term grain reserves for use in the event of drought. Mr. Skirsky points out the important feature of this technique is that as little as 20 per cent of the FAO and WHO codified radiation limits on irradiated foodstuffs is sufficient for grain disinfection purposes. The accelerator dose is 20-30 kilorad whereas the dosage limit is 100 kilorad.

The concept of electron-positron storage rings for colliders has given rise to another important application of high-energy physics phenomena—synchrotron radiation (electromagnetic radiation of charged particles travelling in a magnetic field at a velocity close to the velocity of light). When the Atomic Energy Institute in Moscow had its modest (450 MeV energy) machine installed about two years ago Indian scientists had evinced interest in a similar facility for Centre for Advance Technology (CAT), Indore. Discussions are apparently on to decide whether CAT will buy the machine from the Novosibirsk Institute or it will be partly developed in India with the Soviet assistance and the rest bought from the USSR.

IMPORTANCE OF RETAINING NUCLEAR OPTION STRESSED

Madras THE HINDU in English 9 Mar 87 p 8

[Editorial]

THE UNINHIBITED AND boastful remarks Pakistan's top nuclear scientist, Dr. Abdel Qader Khan, made recently to an Indian journalist, Mr. Kuldip Nayar, have given a fresh content and edge to the disturbing knowledge that has been with India for some eight years: that Pakistan, under a military dictatorship, has actively pursued a nuclear weapons option and it must now, for all practical purposes, be counted as a country with a nuclear weapons capability (even status). No light has been shed on whether Pakistan has been able to develop a bomb configuration or design, complete with a triggering device, in a militarily deliverable form, but the assumption must be that after the enrichment breakthrough, the ability to fabricate some kind of crudely deliverable nuclear weapon should not be underestimated by Indian policymakers. The controversy set off by the remarks of the man behind the Kahuta uranium enrichment facility has posed at least three major questions or issues originating from the no longer clandestine venture. The first concerns the objective status of the Pakistani nuclear programme. According to Dr. Khan, the Kahuta plant became "fully operational" by the beginning of 1979; "what the CIA has been saying about our possessing the bomb is correct"; Pakistan has been able to upgrade its uranium enrichment to a 90 per cent level, which is clearly weapons grade, and no testing of the nuclear explosive or weapon is deemed necessary since "the testing does not have to be on the ground" and "can be done in a laboratory, through a simulator." These bits of specific information given to the Indian journalist (whether "carelessly" or by design, is hardly important in this case) are in line with the expert evaluations made in the United States, India and elsewhere. They underline the dangerous military character of the thrust of a supposedly peaceful atomic energy programme, which has no opera-

tional power side worth speaking about. With two centrifuge enrichment plants in operation, including an experimental one, this programme obviously has enough explosive grade or weapon grade material to put together one device or more per year; the parallel reprocessing route tried out at Chashma has evidently not been as successful but clearly represents some kind of future menace. The nature of the threat Pakistan sees itself as posing to India is helpfully summarised by Dr. Khan thus: "Nobody can undo Pakistan or take us for granted. We are here to stay and let it be clear that we shall use the bomb if our existence is threatened." Let there, then, be no doubt about either the objective, or the subjectively perceived, nature of the Kahuta uranium enrichment venture and the lesser known endeavour to produce plutonium and reprocess it. This reconfirmed knowledge leads straight to the point that the Prime Minister, Mr. Rajiv Gandhi, has emphasised in Parliament: that the United States has not been involved in any process of restraining Pakistan in its nuclear ambitions, but has actually gone along with it, under the circumstances, by coming up with a dangerous armaments programme that increases the security pressure and burden on India. "America knows it", boasted Dr. Khan and surely this has been the case since at least early 1979 (and almost certainly earlier than that). It was no coincidence that the Carter administration, sensing the Congressional and public mood, went along with the sober political effort that resulted in the Symington amendment of May 1979. It suspended military as well as economic aid to Pakistan and squarely blamed this on the character of that country's nuclear energy activity: the fact that economic aid to India was not suspended (despite the Peaceful Nuclear Explosion of May 1974) demonstrated that the United States could see a substantive difference between the two programmes. But, following the Afghanistan developments beginning in 1979, the Carter administration initially, and then the Reagan administration, brought about a new military relationship with the anti-democratic Pakistani regime which has put a great deal of pressure on India's security. An unprecedented military and economic aid programme—inducting into the South Asian region a qualitatively new generation of weaponry spearheaded by the F-16s—was put in place. Indeed, Pakistan, despite having become a formal member of the non-aligned movement, is being treated by the U.S. as one of its military allies. Specifically, the Reagan administration claimed that the sophisticated conventional weapon supply to Pakistan was required

ed to "dampen" the client's nuclear appetite, or to provide it with a big enough incentive not to go the nuclear weapons route. That has, notoriously, failed to happen and meanwhile the U.S.-Pakistan military liaison has progressed to the stage of joint military exercises, intelligence sharing and so on (to go by the information made available during the current Congressional hearings connected with the proposal for a new six-year \$4.2 billion aid package for Pakistan). The current attitude of the Reagan administration is quite clear: responding to the nonproliferation specialist, Senator John Glenn's letter demanding a suspension of U.S. military aid to Pakistan, Mr. Robert Peck, a senior State Department official, confessed that there was no question of the U.S. obtaining "reliable assurances" from Pakistan about its nuclear venture and appealed to Congress not to do anything to impair U.S. aid to that country through "public confrontations" or "legislative ultimatums." Thus has the fig leaf been removed from the nature of the American policy and it is up to India, its leaders and its people, to draw realistic conclusions from the latest exposures.

The third issue relates to the immediate implications of the Pakistani nuclear menace, and collusive U.S. strategic policy, for India's atomic energy programme and policy. While a very watchful eye has to be kept on the strategic security implications, the advantage is that the long established nuclear policy framework does provide the elements of soundness, restraint, specialised resources and opened flexibility demanded by a very complicated situation. Sovereign India, which is correctly opposed to the discriminatory principle underpinning the Non-Proliferation Treaty and regime, has not acceded to this multilateral arrangement; there is no question today—if there ever was—of caving in to the pressures, just because the Pakistani military regime asks or rather challenges India to sign away (through electing one among a set of discriminatory non-proliferation propositions) its "nuclear option." With the Kahuta uranium enrichment plant fully operational, what is the intention and meaning of Gen. Zia ul-Haq's recurrent call to India to agree to a nuclear weapons free zone in South Asia, or to a mutual "inspection" of facilities? Whose game must he be understood to be playing? Even as India—for reasons of international politics as well as its own security—keeps its nuclear option live and must be expected to watch closely the precise moves by Pakistan at this sensitive juncture, it very soberly keeps in place the self-imposed

restraint on the character of its nuclear energy activity: which is to say that, while there is no doubt that India is a nuclear explosives power (after May 1974) and a power with the full capability to produce a nuclear weapon (if such a security and political requirement were imposed on it), it is at present committed to the exclusively peaceful use of nuclear energy and against any military application. But the sovereign right to decide on the nuclear option, in response to the overall circumstances, has not—it must be emphasised—been signed away.

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INDIA-PAKISTAN NUCLEAR WEAPONS ISSUE DISCUSSED

Khan Interview, Indian Response Examined

New Delhi INDIA TODAY in English 31 Mar 87 pp 72-80

[Article by Dilip Bobb and Ramindar Singh]

[Text] WITHIN the tightly-knit nuclear establishment he is known as Dr Strangelove—after the fictional Hollywood character obsessed with the nuclear bomb. To others, he is a sort of Islamic James Bond, a mysterious and shadowy figure whom the London Observer, way back in December 1979, called "the most successful nuclear spy since Klaus Fuchs and Alan Nunn took their secrets to the Kremlin". Inside

Pakistan, he is hailed as a national hero, second only to its founder, Mohammed Ali Jinnah. And, as a civilian, he is the most heavily-guarded individual after the country's military ruler, General Zia-ul-Haq. His twin-bungalow house on the outskirts of Islamabad swarms with armed personnel of the crack Inter-Services Intelligence unit.

But to the world at large, Dr Abdul Qader Khan, 51, has a greater claim to dubious fame. He is, as international headlines have repeatedly proclaimed, the father of the Islamic bomb. And last fortnight, Dr Khan finally filed for paternity. In a sensational interview to an Indian journalist that exploded around the world, Khan made the tacit admission that Pakistan had a nuclear bomb. As Newsweek later commented: "The interview brought to critical mass the evidence that Pakistan has become the latest member of the world's nuclear-arms club."

Just how critical is now the haunting question. Despite the clumsy denials issued by Khan and Pakistani government officials after the interview appeared in the London Observer, it was patently obvious that he had not only given the interview—his first to a foreign journalist—but also said exactly what was attributed to him by Kuldip Nayar, a veteran journalist generally considered sympathetic to Pakistan. In fact, the immediate fallout of Khan's sensational revelations was the fate of Mushahid Hussain, the dynamic and widely-respected editor of the *Muslim*, an Islamabad daily, who had arranged the 70-minute interview and was present when it was conducted. Hussain publicly confirmed that Khan was interviewed by Nayar and also what transpired. "For too long the Government here has been trying to deny what is obvious to most," said Hussain, who resigned after his paper was forced to print a statement that the interview was a fake.

But in the larger context, Khan's bombshell raised serious

and disturbing questions, not the least being its curious timing, its effect on the strategic balance in the subcontinent and the likely response from India, already a member of the nuclear club. The interview was actually conducted on January 28 when the border tension between the two traditional adversaries was still a serious issue. It also appeared just before the US Congress was scheduled to discuss the passage of the new US\$ 4.02 billion (Rs 5,523 crore) military aid package for Pakistan.

In the context of the existence of the 1977 Symington Amendment, which outlaws a direct US foreign assistance programme to any country which delivers or receives unsafeguarded nuclear enrichment, reprocessing equipment or technology, Khan's statements seemed suicidal. He stated, for instance: "We have upgraded it (highly-enriched or weapons-grade uranium) to 90 per cent to achieve the desired results." And, asked if Pakistan had tested the bomb, he retorted: "Is it necessary? America has threatened to cut off all its aid. The testing does not have to be on the ground. It can be done in a laboratory through a simulator."

South Block is convinced that Khan's statement was not an impulsive outburst by a brilliant scientist frustrated with having to hide his light under a semi-transparent bushel. It was, instead, a carefully calculated and specifically directed message with the covert blessings of Pakistan's military establishment. "It is impossible that a man as heavily guarded and as important to Islamabad as Dr Khan could meet an Indian journalist for over an hour to discuss their nuclear programme without some sort of green signal from the military leadership," says a foreign office official.

In fact, Nayar says that he has been visiting Pakistan every year for the past four years and each time has requested an interview with Khan which was refused. This year, when he arrived, Hussain said: "This time he will see you." Hussain had met Dr Khan earlier and informed him of Nayar's impending arrival. The day after his arrival, Nayar was told that the interview was arranged for that evening. "For 70 minutes we spoke of the bomb and nothing else. He knew that every trip to Pakistan I had asked to see him and he also knew I was a journalist," says Nayar.

All this suggests that Khan had obtained clearance from higher authorities in which case, his pronouncements acquire special significance. Barely a month ago, on February 16, US Ambassador to Islamabad Dean Hinton delivered a hard-hitting speech to the Pakistan Institute of Strategic Studies which seemed like the first official public warning from the US about the path of Pakistan's nuclear programme since President Carter used the Symington Amendment in 1979 to suspend military and economic aid to Pakistan. "There are developments in Pakistan's nuclear programme which we see as inconsistent with a purely peaceful programme," declared Hinton, adding: "There are indications that Pakistan may be seeking a weapons capability." He went on to remind Pakistan of the 1985 Congressional legislation that requires the US President to annually certify that Pakistan does not possess a nuclear explosive device for the continuance of US aid and suggested that

Pakistan sign the nuclear Non-Proliferation Treaty (NPT) as a pre-condition to the aid package.

Hinton's speech caused an immediate furore in the Pakistani media as well as the National Assembly and Islamabad was quick to lodge strong objections to his statements. The forceful message emanating from Islamabad in the wake of the Hinton speech was that Pakistan was not going to allow itself to be "browbeaten and pressurised" by the US in pursuit of its national objectives and that its "peaceful" nuclear programme was in no way tied to US military and economic aid. In that sense, Indian officials are convinced that Pakistan's military establishment embarked on a deliberate strategy of ambiguously inform-

ing the Reagan Administration that any extension of the waiver of the Symington Amendment has to be based on considerations other than Islamabad's nuclear quest.

Indian officials believe that Pakistan's strategy was three-fold. One, to reassure the Pakistani people that Pakistan is an independent country which is not tied to the coat-tails of Uncle Sam. There has been considerable public and media criticism recently of Pakistan being too subservient to US interests, and special concern has been expressed about the presence of three million Afghan refugees on Pakistani soil and its attendant socio-economic dangers. At an international level, the strategy was directed at the US Congress, the message being that if the US wanted to continue to use Pakistan as a conduit for arms supplies to the Afghan rebels and to provide them sanctuary, it would have to approve the aid package. The third target for the message was obviously New Delhi.

Mushahid Hussain echoes that viewpoint. "The message given by Dr Khan is directed against all detractors of Pakistan's Islamic bomb. To the Indians, it is a 'hands-off' warning at a time when Delhi has been carrying massive warlike exercises along our border. Concurrently, it is a signal to the Americans not to link the nuclear issue with the aid package since the former is now a fait accompli."

But a senior Foreign Ministry official pointed out: "I doubt that Islamabad would have embarked on such a strategy had a moralist like Carter been President. But with Reagan in the chair, they are quite confident that the US needs them more than the other way round. The US is also worried about the direct talks between Pakistan and the Soviets and the recent improvement in Pakistani-Soviet relations." Adds K. Subrahmanyam, director of the influential Institute for Defence Studies and Analysis (IDSAS): "I think most people in India do not realise the

extraordinary leverage Pakistan has gained vis-a-vis the US."

This has now been confirmed by last week's *Washington Post* story which revealed that the Reagan Administration has ensured that the \$ 4.02 billion aid package to Pakistan is almost certain to be passed by the US Congress later this month. In any event, as far as South Block is concerned, all past revelations in the American media regarding the path of Pakistan's nuclear programme—and its effect on the Reagan Administration—have rendered the annual certification by the US President a meaningless ritual. Examples:

► In 1983, American columnist Jack Anderson, quoting CIA sources, reported that China was helping Pakistan in designing nuclear triggers.

► In February 1985, Pulitzer prize-winning investigative journalist Seymour Hersh produced a documentary that conclusively proved that Nazir Ahmed Vaid, a Pakistani national posing as an innocent businessman, had illegally tried to smuggle 50 timing devices used to trigger nuclear bombs out of the US at the behest of the Pakistani Government. The devices, called Krytrons, are such sensitive items that their sale is tightly restricted and their purchase by outsiders can only be okayed by the State Department. Vaid was tried, found guilty, given a mild sentence and deported to Pakistan.

► In June 1986, John Scalley, a veteran reporter for ABC News, revealed that Pakistan had successfully tested a nuclear trigger.

► In November 1986, star reporter Bob Woodward of Watergate fame, now managing editor of the *Washington Post*, announced that Pakistan had succeeded in enriching uranium to 93.5 per cent (confirmed by Dr Khan in his interview) and that it had tested the trigger in a high explosive device between September 1 and September 18, 1986. Woodward confirms that Pakistan is "two screw-driver turns away from the bomb".

► On February 23, 1987, Leonard Spector of the US-based Carnegie Endowment for International Peace and a leading nuclear specialist, released a report based on US Administration sources that stated: "Pakistan now has the components for its first nuclear device...and has arrived at the nuclear-weapons threshold." The report said that Pakistan has enriched uranium to over 90 per cent, tested a triggering device and acquired the

capability to produce all of a nuclear device's components.

Meanwhile, officials of the US State Department's policy planning unit told *INDIA TODAY* that Hinton's warning speech in Islamabad was drafted by the State Department and was specifically aimed as a sop to the US Congress as a reassurance that the US Administration was keeping a close watch on Pakistan's nuclear programme and that any concern about it should not come in the way of the military aid package.

But the more immediate concern is in the Indian context. Having just recovered from a situation that took the two countries to the edge of war, Khan's claim that Pakistan has the bomb has triggered off considerable debate and public consternation. In both houses of Parliament, MPs from the ruling party and the Opposition raised a concerted demand that India should make a nuclear bomb to counter the Pakistani threat. In a snap poll conducted by a Sunday newspaper, a vast majority (69 per cent) of those interviewed believed Pakistan had the bomb and 68 per cent felt India should take a similar path.

And, though a wide range of scientists involved in India's nuclear programme interviewed by *INDIA TODAY*

scoffed at Dr Khan's claims of having produced the bomb and warned against India being forced to "mortgage its future development and go in for a nuclear arsenal", all available evidence seems to indicate that they are ignoring reality. With its 13-year headstart in the nuclear race, India is still undoubtedly miles ahead of Pakistan in terms of technology. But Khan's boastful statements seem to confirm that they have considerably narrowed the gap.

THE BBC Panorama team's documentary film *The Islamic Bomb* remains the best-researched investigation into how and where the Pakistanis acquired the material and technology to build the bomb (see box), starting with the top-secret meeting of Pakistani scientists in Multan convened by the late Pakistan President Z.A. Bhutto when he asked them how long they would take to build him a bomb. That meeting took place in January 1972, a full two years before India exploded a nuclear device at Pokharan in the Rajasthan desert in 1974.

The film also establishes that the money to finance Project 706, the Pakistan bomb, was provided by Libya in 1973, a year before the Indian nuclear explosion took place. Since then, Pakistan has employed an intricate network with the help of European middlemen and their own nuclear spies like Dr Khan to acquire sensitive western technology and embark on its dual route to the bomb. Says Subrahmanyam: "Pakistan is aware that it cannot keep pace with India's defence modernisation programme. Nor can it depend on US military support forever. It has decided that the cheapest defence option is for it to go nuclear."

Presuming that Pakistan now has the bomb, what then are the options open to India? Indian intelligence sources are convinced that Pakistan is readying for a Pokharan-type nuclear explosion before the year is out. Edward Luttwak, the Pentagon analyst who predicted the Israeli attack on Iraq's Osirak research reactor, says that a nuclear detonation by Pakistan would be a warning that it could soon have a

weaponised device. "During that intervening period, the pressure on India to act, to disarm the Pakistanis, would be enormous. There is always the possibility that the Indians will not allow the Pakistanis to make the transition from a crude device to a bomb," he said.

KNOWLEDGEABLE circles within the Indian defence and intelligence establishment confirm that Israel had made an offer to the Indian Government to bomb the Pakistani nuclear facility at Kahuta provided their F-16s were allowed to operate from an airfield in India. Successive Indian governments under Mrs Gandhi, Morarji Desai and recently, Rajiv Gandhi, have rejected the offer though sources say the

option remains open. But analysts and officials now discount the possibility of Israel via India or Indian Air Force Jaguars or Mirage 2000s launching a pre-emptive attack on Kahuta. "That would be criminally stupid," says Subrahmanyam, the most vocal advocate of the bomb, who recently chaired a UN committee on nuclear deterrence. "We can destroy Kahuta but it won't hurt their programme," he insists.

Pakistan is well aware of that particular threat. Khan stated that "India knows what price it would have to pay for attacking

Kahuta. In any case, the plant is well protected and we have not put all our eggs in one basket," indicating that Pakistan may have other secret installations. Last week, Pakistani Prime Minister Mohammed Khan Junejo issued a stern warning that Pakistan "would go to war if Kahuta was bombed". In

fact, defence analysts say that India is much more vulnerable because it has a number of plutonium-fuelled reactors which, if bombed, would spread radio-activity over heavily-populated areas. An attack on the Dhruva reactor at Trombay would render the entire city of Bombay unliveable. In any event, both countries have recently signed an

agreement eschewing an attack on each other's nuclear facilities.

The other option is for India to go ahead and build the bomb. Though top government officials interviewed by INDIA TODAY discount the possibility, they also admit that were public opinion and domestic political compulsions to coincide, it cannot be ruled out completely. Writing in the *MSA* journal, top nuclear expert R.R. Subramaniam, who has recently joined the Ministry of External Affairs (MEA), had said: "If Pakistan succeeds in conducting a nuclear test, popular opinion in this country will not tolerate a govern-

ment which does not take immediate steps to overtake Pakistan in nuclear-weapons capability. No one expects Indian leaders to announce beforehand what steps they would take, but anyone who believes that after a Pakistani nuclear test India could continue to remain non-nuclear weapon-wise is totally out of touch with reality." In fact, there are many analysts inside and outside the country who believe that India, notwithstanding its protestations to the contrary, already has the bomb. Khan himself said that "India has carried on with its weapons research programme and they now have a much bigger bomb" (The Pokharan device was around 12 kilotons). Leonard Spector, in his latest report, notes that "India has gone to extraordinary lengths to develop a supply of plutonium beyond the reach of international inspection and control".

And, some Indian analysts argue that the country's massive nuclear energy programme was always intended to fuel a weapons arsenal. The leading proponent of this view is Professor Dharendra Sharma of Jawaharlal Nehru University and convenor of the Committee for a Sane Nuclear Policy. In his most recent book, *The Indian Atom-power and Proliferation*, Sharma states that "the policy in India has shifted secretly from one of developing nuclear energy for avowedly peaceful purposes to one including political and military aims". The burden of Sharma's argument is that Indian nuclear scientists have opted for pressurised heavy water reactors (PHWR) which produce plutonium, the most convenient fissile material for a bomb. It was a plutonium device that India exploded in 1974.

However, scientists of the Atomic Energy Commission (AEC) say the choice of PHWR technology does give India a weapons option but this is not the reason why it was selected. Pressurised heavy-water reactors fuelled by Uranium 238 are part of the AEC's long-term plan to use indigenously available fuels to generate a large chunk of the nation's electric power. "We have to have a base of reactors of the pressurised heavy water type to produce a certain output of plutonium which will fuel our fast breeder reactors. The plutonium-based fast breeders will irradiate thorium (which is available in large quantities in India) and produce Uranium 233, which can then be put back into the PHWR

to complete the fuel cycle," says N. Srinivasan, former head of the AEC's heavy-water projects.

In fact, after the hawkish K. Subrahmanyam left the Defence Ministry, the Indian Government appears to have no identifiable bomb lobby. Subrahmanyam himself says that, going by public pronouncements, the only bomb lobby he can identify is the Army Chief General K. Sundarji. In the Order of the Day he issued on taking over as chief of army staff on February 1, 1986, Sundarji highlighted the army's concern about the "nuclear weapon capability of our potential adversaries". Asking the army to be prepared to face both a conventional and a nuclear threat, Sundarji said: "Our government is aware of the threat and I can assure you that if a war is forced upon us they will not make us fight our adversary at a disadvantage". Sundarji's concern goes back to the days when, as head of the College of Combat, he wrote a well-received paper on nuclear asymmetry. In fact, the College of Combat's *Combat Papers 1 and 11* clearly state that "conventional superiority vis-a-vis a nuclear Pakistan would be no effective deterrent".

Apart from frequent we-are-keeping-our-options-open statements by the prime minister and the minister for external affairs, Sundarji's remarks are the first real admission that India would not allow itself to be caught in a situation of nuclear asymmetry vis-a-vis Pakistan. Though neither Sundarji nor anyone else in the Government may openly announce it, the army chief's assurance clearly means that once Pakistan fabricates a nuclear weapon, India will have no other option. Political analyst Hari Jaisingh says: "The Congress(I) is keeping its options open. The BJP's stand is crystal clear. It wants a swadeshi bomb. Even the Janata Party has said the country cannot afford to be caught unguarded. The leftist parties, notwithstanding certain reservations, would by and large, go along with the bomb lobby. In fact, barring certain groups of pacifists, any decision by Rajiv Gandhi's Government to publicly commit the country to the nuclear (weapons) path will have popular support."

The Indian bomb lobby has always emphasised certain obvious dangers in a nuclear-armed Pakistan as against a non-nuclear-armed India. These include the fact that:

- ▶ a nuclear-armed Pakistan will project an image of power far in excess of India;

- ▶ it will naturally assume the leadership of the Islamic world, attract oil money and the loyalty of Muslims beyond its borders, including in India;

- ▶ Pakistan can afford to take more risks with India. It will be seen as a far safer haven for Indian extremist forces;

- ▶ it will signify a weak leadership in India, leading to domestic and political upheavals and reduce India's clout with other neighbouring countries;

- ▶ the cost of India not going nuclear will be to put all New Delhi's eggs in the Soviet basket, damaging India's international image and rendering it critically vulnerable in defence terms should the Soviets back out for their own reasons.

But if India does decide to switch nuclear routes, how long will that take? And what will be the cost? Even experts do not

agree on the time-frame, primarily because this is the most closely-guarded secret in the Government. While a Defence Ministry scientist said perfecting a deliverable nuclear weapon would take anything from six to eight months, K. Subrahmanyam feels that from the point of decision, it would require five to six weeks.

The relevant issue at this moment is the availability of a delivery system, and the related question about the size of the device. If India has been working at perfecting a weapons capability, then it would now have, or be in a position to fabricate, a sophisticated, small-sized tactical nuclear weapon weighing around 1,000 lbs or less which could be carried to the target by the IAF's Mirage 2000s and Jaguars.

The same applies to Pakistan, only more so. It is more likely that Pakistan's device is large, crude and heavy and the Pakistani Air Force (PAF) will therefore be hard put to deliver it over a target with available delivery systems. For this reason, Pakistan has been trying to get the F 16C from the US. The F 16C, which has a strengthened centre-plate pylon capable of carrying a weight of 4,000 lbs, is likely to be Pakistan's preferred delivery system. Alternatively, warned a senior officer of the IAF, Pakistan could modify some of its longer range surface to air (SAM) missiles for a surface-to-surface (SS) role which would give it a range of up to 200 km, enough to threaten a large number of border towns with destruction.

India, however, does not lack a delivery system for

carrying heavier bombs. This is ensured by the ongoing programme to perfect a range of rockets capable of putting satellites in orbit. These rockets could also carry nuclear warheads to any target in Pakistan. The Defence Ministry's missile-testing range at Baliapal in coastal Orissa could also possibly be meant to test missiles capable of delivering nuclear warheads. Says a top Defence Ministry scientist: "Deterrents must be viewed not by

numbers but by the certainty of retribution. A credible arsenal depends not on numbers but on the range and accuracy of the delivery systems. As far as Pakistan is concerned, we have to ask the question: Will Pakistan survive if two of its major cities like Lahore and Rawalpindi are destroyed? That would be unacceptable damage as far as Pakistan is concerned."

BUT the cost for India to take the bomb route—financial and diplomatic—could be astronomical. According to experts, an effective weapons programme of 150 or so warheads in 10 years would cost around Rs 200 crore a year to start with, increasing to Rs 600 crore a year later. However, a traditional rule of thumb in the West is to compute the cost of a nuclear component at 10 per cent to

12 per cent of the total defence expenditure. In India 12 per cent of the 1987-88 defence budget of Rs 12,000 crore, comes to Rs 1,440 crore a year. Bhabani Sengupta in his book *Nuclear Weapons—Policy options for India* puts the cost of a second-generation nuclear deterrent for India at Rs 15,000 crore. But, he adds: "The cost of conventional defence cannot remain at the current level if Pakistan goes nuclear. The armed forces will, if nothing else, have to be equipped to fight a nuclear war. That means that all the western front divisions will have to be mechanised, and that alone would cost Rs 10,000 crore over 10 years."

Bhabani Sengupta and K. Subrahmanyam, however,

agree on one vital point: that a situation in which Pakistan has the bomb and India doesn't, would be unacceptable to India. Says Sengupta: "We could never tolerate a Pakistan with nuclear weapons if India has none. No government in India could resist public pressure to respond in kind to a nuclear Pakistan. India will therefore inevitably make nuclear weapons." Subrahmanyam is equally direct. "We are hostages to Pakistan on the nuclear issue," he says. "If (Pakistan) has the bomb and we don't, we can be subjected to nuclear blackmail. They can make us do what they want."

Most advocates of the bomb, however, view nuclear weapons for India as an insurance policy with costly annual premiums but long-term security. Officials in the Defence Ministry and MEA are not prepared to commit themselves on what India's response will be. But in off-the-record conversations, the general consensus is that India will most probably adopt a policy of covert nuclearisation like that followed by

Israel and South Africa. In other words, publicly deny the bomb but go ahead and obtain it and covertly let potential adversaries know you have it. "In fact, do exactly like Pakistan did but less clumsily," is how one official described it.

The other option, for the two countries to sign the NPT, also seems remote. India has strongly opposed the NPT on the grounds that it is heavily biased in favour of the nuclear powers and because

countries like Israel and South Africa carry on their nuclear programmes unhindered. Pakistan has refused to sign till India signs. The logical option is for India and Pakistan to come to a mutual agreement on the nuclear weapons issue. Even Dr Khan told Nayar: "You have it (the bomb) and now we have it. Now you must come to a *faisla* (understanding) with us." But again, India is hardly likely to sign a nuclear weapons agreement that does not include China.

The result is a critical stand-off. By last fortnight, it was clear that India was keeping its nuclear card close to its chest and any decision would have to wait till the current state elections were over. When India set off its underground nuclear blast in 1974, the code phrase used to announce its success was "The Buddha is smiling". All that can be said regarding the Indian response is that the Buddha is no longer smiling but, in fact, looking decidedly worried.

'Routes' to Pakistan's Bomb Explained

New Delhi INDIA TODAY in English 31 Mar 87 pp 76-77

[Article by Raminder Singh]

[Text]

THE source is simple and innocuous. The same reactors that quietly churn out electricity have, in recent years, most often turned out to be the womb where bombs were born. The process is easy. Textbooks abound which explain how almost any nuclear reactor can be used to make a bomb. The key ingredient, for both bombs and reactors, is the same: uranium or plutonium—both of which are fissile, that is, their atoms are capable of being split. Scientists must split the atoms to produce fast moving particles called neutrons, which collide with and split the nuclei of neighbouring atoms, unleashing more neutrons in a chain reaction which releases tremendous amounts of energy.

In a nuclear reactor such a chain reaction is kept under control by using "absorbers", usually boron or cadmium rods. When lowered into the core of the reactor, these rods capture neutrons which might otherwise have split more atoms. But if the fissile material is pure enough, and compressed sufficiently, as in a bomb, the chain reaction speeds up. Heat accumulates and the material blows apart, producing the nuclear age's familiar mushroom cloud.

Uranium in its natural form—Uranium 238—is not fissile enough to make a bomb, and has to be enriched to levels above 50 per cent. But enrichment is a complicated and expensive process. The other and simpler fissile material for a bomb is plutonium. Plutonium is a natural by-product of the fission process that occurs in most uranium-fuelled power reactors. And it is relatively easy to chemically separate plutonium from other radioactive material.

Once bomb-makers have the fuel, they can choose from two basic designs. In the "gun" model, dropped on Hiroshima, conventional explosives are used to drive together two pieces of uranium to form a single chunk. The force of the collision starts a chain reaction, triggering off a nuclear explosion. This is the easiest technique that Pakistan could employ, if it wanted to test a uranium device.

The other option open to Pakistan is to have an "implosion

type" device, using plutonium as the core. The plutonium would be formed into a hollow sphere, containing a small neutron source like radium or beryllium. The plutonium itself would be wrapped in a uranium or beryllium reflector which helps to contain the neutrons and prolong the chain reaction. This whole package is surrounded by a layer of explosive charges called lenses, carefully shaped to direct the force of their detonation inwards, towards the plutonium core. The simultaneous detonation of the lenses creates a shock-wave, which compresses the plutonium into a supercritical mass, which in turn starts a chain reaction producing an atomic blast like in Pokharan in 1974.

Pakistan could easily use enriched uranium as the core of its bomb, or plutonium, which Indian intelligence agencies believe it extracted from used fuel spirited away from the Kanupp reactor near Karachi. The Krypton switches it got from the US and used to test the triggering device last year, indicate that Pakistan's bomb may be plutonium-based. But experts still believe that Pakistan is using enriched uranium financed by Libya's Colonel Qaddafi.

Pakistan had two possible routes open to it, and it set out simultaneously on both. The easiest route was to reprocess spent fuel from the Candu type reactor that Pakistan had obtained from Canada in the early 1970s to produce plutonium. For a reprocessing plant, Pakistan turned to Francois Poincet, a powerful French industrialist and head of SGN, one of the world's biggest exporters of reprocessing plants. Poincet accepted the Pakistani plea that they wanted the plant for a civil power programme. The French Government and the International Atomic Energy Agency (IAEA) wrote compli-

cated safeguards into the agreement, but they proved useless in the face of Pakistan's determination to build the bomb. France, under pressure from the Carter administration, finally cancelled the sale of the reprocessing plant, but Pakistan went ahead and had parts shipped out by an Italian subcontractor.

Pakistan's simultaneous progress on the second route to the bomb, using enriched uranium, began in the summer of 1972 when Abdul Qader Khan moved to Amsterdam and got a job with a subcontractor to Urenco, the Dutch-British-German consortium which runs a huge uranium-enrichment plant in Holland. This plant had the kind of centrifuges Pakistan would need. There Khan was recruited by Pakistani agents, and he told them what they needed to buy. On December 15, 1975, Khan disappeared and re-

surfaced in Islamabad. The components used at Kahuta had all been bought in Europe, from deals Khan was involved in.

Inside the cascade hall at Kahuta, are several thousand centrifuges which can produce enough enriched uranium for six weapons a year. The enrichment process is so complicated and so costly, that it provided the perfect cover for Pakistan's intentions. Almost no scientist in the West believed that Pakistan would or could take on such a challenging task. Pakistan first bought centrifuge inverters from Emerson Electric in Swindon, UK. In 1976, three Pakistani buyers went to Swiss firms to buy valves for the uranium enrichment plant and asked another firm to design and build a system to feed gas to the centrifuges. This was the biggest and most blatant order, placed by the Pakistanis, and three chartered Hercules planes were needed to fly the plant to Pakistan.

INTERVIEWER ON TALK WITH PAKISTAN NUCLEAR SCIENTIST

Calcutta THE STATESMAN in English 11 Mar 87 p 9

[Article by Neerja Chowdury]

[Text]

NEW DELHI March 10.—Speaking about his controversial interview with Dr Abdul Qadeer Khan in Islamabad, Mr Kuldip Nayar said today that he had the impression that the father of the Islamic bomb had exceeded his brief when he had admitted that Pakistan possessed the bomb.

His brief probably was to drop hints to make clear that Pakistan had the bomb but without providing any confirmation, Mr Nayar said. But Dr Khan, respected in Pakistan next only to Mohammed Ali Jinnah, had been provoked by Mr Nayar into admitting that Pakistan had the bomb during the 20-minute interview. "Never did he say that any part of the interview was off the record", he said.

Dr Khan had "hit the road" when Mr Nayar had drawn his attention to a statement made three years ago by Dr H. N. Sethna, the then chairman of the Atomic Energy Commission, that Pakistan had neither the capability nor the men to manufacture the bomb.

Mr Nayar, who was speaking at a meeting organized by the Krishna Menon Society at the Indian Law Institute, was discounting various theories which have been propounded since his interview with Mr Khan was first published on February 22.

Mr Nayar said that he had interviewed the 51-year-old nuclear scientist in his home outside Islamabad. The meeting was by previous appointment. He was accom-

panied by Mr Mushahid Hussain, editor of the Islamabad-based English paper, Muslim, which had also published the interview. Mr Hussain had subsequently resigned.

The occasion was not a social one, Mr Nayar clarified, as Mr Khan had tried to make out in his denials, though the Indian visitor

had been served tea and chocolate cake.

He had no doubt that the interview had been "cleared at some level". Otherwise he would not have been allowed near the house of Dr Khan which was "littered" with intelligence men.

It was unfortunate that instead of admitting his indiscretion Dr Khan had allowed Mr Mushahid Hussain, a patriotic, courageous and outstanding journalist to be made a scapegoat.

Mr Hussain, who has been a critic of American foreign policy in the sub-continent and had been in favour of accepting the Soviet proposals on Afghanistan, was made to resign "under pressure from the American Administration", Mr Nayar alleged. He said that he was making his statement with full responsibility. The day Mr Hussain was removed, there was a champagne party given in the American Embassy in Islamabad, he said.

The meeting was presided over by Mr S. Sahay. Mr P. N. Haksar endorsed Mr Nayar's view that India should act maturely and develop a vision of "structural and durable peace" in the sub-continent.

/12379

CSO: 5150/0116

DECISION ON NUCLEAR OPTION EXPECTED THIS YEAR

Madras THE HINDU in English 8 Mar 87 p 1

[Article by G.K. Reddy]

[Text]

NEW DELHI, March 7.

A major policy decision on the exercise of the nuclear option is expected to be taken by India in the course of this year after weighing the political and strategic pros and cons carefully in the light of the progress made by Pakistan in acquiring nuclear weapons.

The Government of India is proceeding on the assumption that Pakistan, which has had a workable bomb design along with a tested triggering mechanism for more than a year, has now enough highly enriched uranium for fabricating at least one device in the near future, if it has not done so already as claimed by Dr. Abdul Qadeer Khan, head of its nuclear establishment.

There are at present two centrifuge enrichment plants in operation in Pakistan, one at Kahuta which is already producing weapon grade material and the other at Sihala still operating on an experimental scale. The plant at Kahuta is reported to have a current capability of operating 1,000 centrifuges, against the planned capacity of 2,000 to 3,000 centrifuges, producing about 15 kgs of highly enriched uranium (HEU) a year.

The quantity of fissile material required for making a nuclear bomb ranges from 10 to 15 kg of HEU depending on the design. It means that Pakistan has enough enriched uranium in its possession to fabricate at least one, or perhaps even two, bombs at short notice.

But there is no reliable information yet whether Pakistan has succeeded in developing a bomb design in a deliverable form to be militarily usable against specified targets. The U. S. intelligence agencies have been hinting that Pakistan was only two or three screw-driver turns away from putting together a workable nuclear device, but they have been rather reticent in disclosing whether it was already in possession

of one or more warheads that could be carried by F-16s or other sophisticated aircraft.

According to Indian experts, Pakistan has tried to follow both the plutonium and uranium routes to acquire a higher degree of flexibility for its nuclear weapon programme. An agreement was signed with France in early 1970s to set up a reprocessing plant at Chashma, but before the French Government backed out under American pressure it had already furnished the blueprints for the plant.

The Pakistani Government was able to buy sensitive equipment from the international black and grey markets for setting up a modest reprocessing plant called New Labs at Chashma with the help of these French blueprints. But this facility has not yet been fully developed for producing weapon grade plutonium, with the result that Pakistan is relying primarily on enriched uranium produced at Kahuta.

The Indian visualisation is that in another few years Pakistan would be able to use both plutonium and enriched uranium for nuclear weapons without relying entirely on any one particular route.

The Government of India has been studying both the regional and global implications of this grave development which sooner or later will involve the other nuclear powers like the United States, the Soviet Union and China in a scramble for geopolitical influence. As the biggest country in South Asia, India cannot logically remain unaffected by these developments by ploughing its lonely furrow of self denial in the name of non-proliferation.

And enough pressures are already building up within the Government to give adequate freedom to Indian nuclear scientists to keep abreast of these developments without waiting for a political decision to exercise the option at the right moment. The feeling in defence circles also is that India should not be caught napping if a critical situation were to develop.

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CSO: 5150/0113

BRIEFS

MINISTER ON URANIUM ENRICHMENT—Indian scientists are keeping abreast of all aspects of research and development connected with uranium enrichment technology. The minister of state for atomic energy, Mr K.R. Narayanan, said in the Lok Sabha today the government is aware that Pakistan is having an enrichment plant at Kahuta with capability to produce weapon grade uranium. The minister said India's policy continues to be to use atomic energy for peaceful purposes. [Text] [Delhi General Overseas Service in English 1330 GMT 8 Apr 87] /8309

CSO: 5100/4738

FRG SCIENCE MINISTER CONTINUES OFFICIAL VISIT

TA161434 Jerusalem Domestic Service in Hebrew 1400 GMT 16 Apr 87

[Text] Israel and Germany have begun deliberations on the supply of a nuclear power station, a new and particularly safe type that has been developed in Germany. This was reported by Gid'on Pat, the science and development minister, at the end of talks held with Heinz Reisenhuber, the West German research and technology minister. He added that in a joint talk with Foreign Minister Shim'on Peres, the latter raised the possibility of declaring the site designated for the reactor, in the Shivta area in the Negev, as an extraterritorial zone (shetah exterritoriali), thus removing, in Peres' opinion, the objection to selling nuclear technology to Israel because it is not a signatory to the nuclear non-prediction treaty. According to Peres' proposal, it will thus be possible to maintain supervision over the nuclear facility, as required by the treaty, in the area that will be taken out of Israeli sovereignty.

Our correspondent Gid'on Remez reports that Minister Reisenhuber refrained from expressing an opinion on the possibility of selling a reactor to Israel. He only noted that the type of the reactor developed and experimented with in Germany is characterized by maximum guarantees against failures and radiation leaks, as well as by a modular structure that makes it possible to adjust the reactor size to the particular area.

/9274

CSO: 5100/4520

BRIEFS

NORWAY DISSATISFIED WITH USE OF HEAVY WATER--Oslo, 9 Apr (AFP)--Norwegian authorities Thursday revealed they are dissatisfied with Israeli clarifications on Israeli use of Norwegian heavy water. "Israel shows little interest in investigating how the heavy water has been used," Foreign Office spokesman Per Paust said. A representative of the Foreign Office visited Israel a month ago to study the Israeli use of Norwegian heavy water, shipped between 1959 and 1970. The Israelis were not very accommodating. They underlined the technical problems involved in identifying the Norwegian heavy water," Mr Paust said. [Text] [Paris AFP in English 1357 GMT 9 Apr 87 AU] /9274

CSO: 5100/2436

AFRICAN SCIENTISTS URGED TO COLLABORATE IN NUCLEAR RESEARCH

Accra PEOPLE'S DAILY GRAPHIC in English 31 Mar 87 pp 1, 5

[Article by Adwoa Van-Ess]

[Text] Dr A. K. Ahafia, Chairman of the Interim Management Committee (IMC) of the Ghana Atomic Energy Commission (GAEC), has called on African countries to collaborate in the field of nuclear science to cut down on huge financial investments on research reactor facilities.

He was opening a month's regional advanced course on X-ray fluorescence analysis, for 16 countries in Africa at the National Nuclear Research Institute at Kwabenya near Accra yesterday.

It is being organised and sponsored by the International Atomic Energy Agency (IAEA) and the GAEC.

Participants from 10 countries have so far arrived for the course. They are from Cote d'Ivoire, Kenya, Libya, Madagascar, Nigeria, Sudan, Syria, Tanzania, Zaire and Ghana.

The X-ray fluorescence analysis, Dr Ahafia explained is a valuable scientific technique to identify and measure the quantity of metals and other elements present in soils, water, medicine and the atmosphere.

He said the technique is important to African countries to enable them to discover and exploit their bountiful mineral resources, and assist in the documentation of the potential of herbs.

Dr Ahafia said it will also go a long way to assist in agriculture, medicine and industry.

He said the Commission has not made the expected impact during its 24 years of existence and expressed the hope that the government will increase its financial support to enable it to accomplish its potential in applied nuclear science, and technology in agriculture, medicine and industry.

Dr Ahafia commended the IAEA for its assistance to the GAEC and said currently, the Agency is sponsoring nine technical cooperation projects in Ghana. He said it has also been providing training facilities overseas for Ghanaian nuclear scientists.

PAPER URGES MORE FUNDING FOR NUCLEAR RESEARCH CENTER

AB010930 Accra Domestic Service in English 1300 GMT 31 Mar 87

[From the press review]

[Text] The PEOPLE'S DAILY GRAPHIC discusses the Nuclear Research Institute at Kwabenya in the Greater Accra Region. It says the institute has not been able to achieve the aims for which it was established by Dr Kwame Nkrumah. The GRAPHIC says since the overthrow of Dr Kwame Nkrumah over 21 years ago, there has been a long spell of inactivity at the Nuclear Research Institute. Currently, there is a 1-month regional advanced course on X-ray fluorescence for 16 countries in Africa at the Nuclear Research Institute, and as the chairman of the interim management committee of the Ghana Atomic Energy Commission, Dr A. K. Ahafi, said at the opening ceremony yesterday, the commission has not made the expected impact since its establishment.

It is in this light that Dr Ahafi's call on the government to give the commission the necessary financial push to accomplish its potential in applied nuclear science and technology in agriculture, medicine, and industry should be viewed.

According to the GRAPHIC, nuclear technology has done a lot to change the development processes of many countries. Some countries, like India, have gone very far in using the services of the nuclear reactor in evolving high-yielding and disease-resistant varieties of crops, the preservation of food, and in the diagnosis and treatment of various diseases including cancer. The paper maintains that since the benefits of an atomic reactor are enormous, and Ghana was fortunate to have had the foresight and initiative in building one, we have to do everything possible to put in more funds to enable us to reap the services of nuclear technology.

The X-ray fluorescence analysis, concludes the GRAPHIC, is said to be a valuable scientific technique to identify and measure the quantity of metals and other elements present in soils, water, medicine, and the atmosphere. If such facilities and knowledge could be made available to the people of Ghana, it would be a positive step in designing appropriate and positive measures for husbanding our natural resources.

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CSO: 5100/35

MAYSTADT ON POSSIBILITY OF BUILDING NEW NUCLEAR POWER PLANT

Brussels LE SOIR in French 14/15 Feb 87 p 2

[Interview of Minister of Economic Affairs Philippe Maystadt by Guy Duplat; date and place not given]

[Text] There is tension in the air between Maystadt and the electric power producers. Not only is the minister of economic affairs not in a hurry to give the green light to the new nuclear power plant at Doel, but in addition he wants to legislate in respect to public rates, promote combined heat and electricity production, and discuss electricity rates for the steel industry. In short, the argument between the electricity sector and Meeus Square is growing from day to day.

[Question] Nuclear energy has demonstrated that it is cheap. The demand for electricity is increasing. In January, the peak even exceeded last year's by 10 percent. And yet you do not want to give the green light for the new nuclear plant?

[Answer] There has been Chernobyl. After that accident, the government drew up a report that is currently being studied by Parliament. It would be inappropriate to take a decision before the end of these proceedings. However, I hope that Parliament will not needlessly delay in drawing the conclusions from the current debate, in particular regarding safety plans.

[Question] If Parliament does not decide on a nuclear moratorium, will you give the green light to Doel V?

[Answer] In order for me to be able to propose a solution to the government I must be fully informed, particularly on the economic aspects of this problem. I have no ideological preconception concerning nuclear energy, I am simply trying to tackle the problem in the most scientific way. At the end of last year, I asked scientific teams of several universities to study the impact of the new energy facts on the equipment plan studies, and in particular to update the models that had been developed for the scientific policy. These studies, which I am expecting in the first quarter of the year, should cover investments in the electricity sector, resort to self-production, and setting of rates.

[Question] You link the issues?

[Answer] The government statement indicated the close link between an ultimate decision on the new nuclear powerplant, the construction of one or two coal fluidized-bed powerplants, and promotion of combined heat and electricity production.

[Question] Is a simultaneous decision necessary?

[Answer] Yes. But I would also like the possibilities for exchange of electric power with France to be considered. A decision on our investments should take into account what is happening elsewhere. We should also talk about the situation created for slag heap exploiters. The "calorie pool" of the electric power producers does not always facilitate their situation. I would also like there to be some discussion of rates. Since reductions in rates are possible, I wonder whether they cannot be focused on the small consumers who need them most. This year, an effort has already been made in this direction with the control committee, since a reduction of 120 francs per consumer was decided on. This is a first step in the right direction of having achieved reduction of the set period of electricity bills. However, more could be done.

I would also like there to be study of the possibility of separating the gas and electricity bills, so that, for example, a consumer who is behind on his gas bill is not deprived of electricity. In respect to cutoffs of gas and electricity specifically, Madame Smet, the secretary of state for social emancipation, and myself think that more could be done. Finally, we should study the situation created for industrial customers such as the steel industry. For example, it is astonishing to me that UNERG should sign a contract with ARBED on better conditions than the electric power producers are offering to Cockerill-Sambre.

[Question] Do you want to interfere in what for 30 years has been the responsibility of the gas and electricity control board, in which owners and unions are combined. That is a new idea. You had already proposed to that board 2 weeks ago a draft bill enabling the government to set certain public rates, but you were turned away by the president of the CSC?

[Answer] I have never said that the control board was functioning poorly. However, one cannot at the same time say that we have a responsibility in this area and forbid us to take action. One could always pass a Constitutional article stating that the minister of economic affairs cannot be involved with electric power, but then let people in the Chamber and Senate stop asking me questions about these problems. Need I remind that the Chamber unanimously introduced a motion calling on the government to take measures in regard to the electricity cutoffs.

[Question] Let us get back to nuclear power. You are not opposed to it in principle?

[Answer] I do not have any preconception. If I am convinced that a supplementary power source is needed and that there is no effective alternative, I will propose this new powerplant, but I have not yet made up my mind. That is why I called for these studies from people who are by nature more independent.

[Question] However, by delaying you affect the Belgian nuclear industry and jobs in ACEC, Cockerill-Mecanique, etc?

[Answer] One does not decide on such investments in order to create jobs. We must study the usefulness of these investments. Whether they are justified, then we strive to derive the industrial benefits from them.

[Question] Also, you are not paying attention to the deadline of March 1987 resulting from the Chooz agreements. If they go past the order date to Framatome, will not the electric power producers be subject to penalties?

[Answer] Those are deadlines and penalties agreed on among private firms. The government is not a party to those agreements.

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CSO: 5100/2428

TOXIC CHEMICAL LEAKS SHUT DOWN URANIUM PLANT

Seven Workers Injured

AU121639 Paris AFP in English 1630 GMT 12 Apr 87

[Text] Paris, April 12 (AFP) — A chemical leak forced the shutdown of a uranium processing plant in Pierrelatte, southeastern France, officials of the Comurhex company said Sunday.

Seven workers were slightly injured stopping the leak overnight Saturday of uranium hexafluoride (UF₆), a barely radioactive but highly toxic chemical, that is later enriched for use as fuel in nuclear power plants.

French Environment Minister Alain Carignon demanded that Comurhex account fully for the accident, which occurred during filling of UF₆ containers. Mr. Carignon was to visit the plant, north of Avignon in the Rhone Valley, Sunday evening.

After the leak occurred, the uranium processing plant was completely shut down and measures were taken to dispel the chemical vapor. The plant will remain closed for several days, the company said.

Meanwhile at Creys Malville, in the Alpine region of southeastern France, a sodium leak at the site of the Superphoenix nuclear reactor persisted Sunday.

About a hundred engineers and technicians were trying to track down the source of the slow leak, which on Friday was allowing a ton of sodium to escape every 48 hours from within the steel vessel housing the generator, in the non-nuclear section of the plant, said Adrien Mergui, president of NERSA, the Franco-Italian-German company that operates Superphoenix. The vessel normally holds 700 tons of sodium.

Meanwhile, the plant was operating at half capacity, said Mr. Mergui, who discounted the possibility of a similar leak occurring in the nuclear section of the plant.

Second Toxic Leak

AU151446 Paris AFP in English 1438 GMT 15 Apr 87

[Text] Pierrelatte, France, April 15 (AFP) — A second leak of toxic uranium hexafluoride occurred Tuesday at the nuclear site at Tricastin in southeastern France, the plant management said Wednesday.

It said the leak was minor — 100 grams of the slightly radioactive material — and it was quickly found and plugged before the gas escaped into the atmosphere.

In Paris, a spokesman for the General Nuclear Materials Company (COGEMA), which operates the enrichment plant, said the uranium hexafluoride was 20 per cent radioactive when the leak occurred, compared to its maximum 90 per cent radioactivity at the end of the enrichment process.

Last week a more important leak occurred during a transfer of non-radioactive uranium hexafluoride in a different part of the same site.

Meanwhile, the head of France's Superphoenix fast-breeder reactor at Creys-Malville, Gilbert Labat, said Wednesday that a leak of toxic but non-radioactive sodium which had been detected at the end of March had been localized.

A small crack in an inside metal layer at the bottom of a storage tank is letting through some 20 liters of liquid sodium per hour, Mr. Labat said. The sodium, he added, is being contained by the outside layer of the storage tank. "It's a metallurgical problem," he said.

Repair work requires specialized equipment which first has to be built and is expected to take about a year, he said. The plant will

continue to operate because the damaged element is separate from the reactor, Mr. Labat said.

The storage tank is to the reactor what a petrol station is to a car, he explained.

Industry Minister Alain Madelin, who was at the scene, had earlier said there was no question of shutting down the reactor because there was "no problem about safety."

The recent leaks have raised questions in the media about nuclear safety, which the government has hastened to calm down.

In a communique, the plant management at Tricastin said the latest leak occurred in a small pipe, was detected immediately and the necessary steps taken.

The only contamination was strictly local, and staff in the vicinity were given routine medical checks, the statement said.

The COGEMA spokesman in Paris said preliminary indications showed that the plant staff had not been contaminated. He added however that he could not be sure until he had seen the results of medical checks.

He insisted that the firm had issued a communique as soon as the leak was detected because, he said, the public opinion is sensitive to nuclear matters and COGEMA does not want to be accused of retaining information.

An all-party parliamentary delegation on trade and industry has complained that several days elapsed before the leak at the Creys-Malville site was officially announced.

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